

EXHIBIT A

**IN THE UNITED STATES DISTRICT COURT
FOR THE CENTRAL DISTRICT OF CALIFORNIA**

TS-OPTICS CORPORATION,

Plaintiff,

VS.

MICROSOFT CORPORATION,

Defendants.

~~~~~

**Civil Action No. 8:24-cv-01974-DOC-DFM**

## JURY TRIAL DEMANDED

**DECLARATION OF DR. RONALD BARRETT IN SUPPORT OF DEFENDANT’S  
OPENING CLAIM CONSTRUCTION BRIEF**

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**DECLARATION OF DR. RONALD BARRETT IN SUPPORT OF DEFENDANT'S  
OPENING CLAIM CONSTRUCTION BRIEF**

I, Dr. Ronald Barrett declare, and state as follows:

1. My name is Ronald Barrett, and I am currently a Professor of Aerospace Engineering at the University of Kansas and a Fellow of the National Academy of Inventors.

2. I submit this **Declaration** in support of the **Opening Claim Construction Brief** of Microsoft Corporation (“Defendant” or “Microsoft”). This **Declaration** will provide relevant background information regarding the technology at issue in U.S. Patent No. 9,612,709 (the “’709 Patent”) (attached as **Exhibit 1**) and the U.S. Patent No. 7,266,055 (the “’055 Patent”) (attached as **Exhibit 2**) (cumulatively “Asserted Patents”), and to set forth my opinions about the meaning of certain disputed terms in the Asserted Patents from the perspective of a person of ordinary skill in the art (“POSITA”).

**I. Background, Experience, and Qualifications**

3. The following is a summary of my background, experience, and qualifications. My background, experience, and qualifications are more fully set out in my Curriculum Vitae, which is attached as **Exhibit 3**.

**II. Compensation and Prior Testimony**

4. I am being compensated for time spent on this matter at my usual and customary rate of \$400 per hour for general work and \$600 per hour for testimony at trial or deposition, plus all reasonable expenses. My compensation is not dependent on the outcome of this proceeding, or the content or specifics of any of my opinions, statements, or testimony.

5. I have previously testified as an expert at depositions and trials. A list of my prior engagements is attached as **Exhibit 4**.

### **III. Materials Considered**

6. In preparing this **Declaration**, I have considered the Asserted Patent ('709 Patent and '055 Patent), their prosecution histories, the parties' claim construction disclosures, and all other materials identified, discussed, or cited throughout this declaration. I also relied upon my over 35 years of education, knowledge, training, and experience in the field of engineering and more than three decades as an inventor of royalty-generating, licensed, patented actuators and controls and associated systems. My control system designs have been licensed by some of the largest corporations in the world, were at the heart of my winning Discover Magazine's *Discover Award* and contributed greatly to my being selected as a Fellow of the National Academy of Inventors (NAI).

7. The testimony I intend to offer is from the perspective of a POSITA.

### **IV. Claim Construction Principles**

8. I am not an attorney. However, I have been informed about several legal principles and standards, as set forth below, which I have used in developing my opinions expressed herein.

9. I understand that claim construction is the process by which a Court determines, as a matter of law, the scope and meaning of terms used in the claims of a patent. I further understand that the goal of this process is to give claim terms the ordinary and customary meaning they would have had to a POSITA at the time of the invention, after reading the entire patent and prosecution history.

10. I understand that the specification may aid in interpreting the meaning of disputed claim language, but particular embodiments and examples appearing in the specification will not generally be read into the claims. I further understand that it is improper to read limitations from a preferred embodiment described in the specification (even if it is the only embodiment) into the claims absent a clear indication in the intrinsic record that the patentee intended the claims to be

so limited.

11. I understand that there are two exceptions to the general rule that claim terms are construed according to their plain and ordinary meaning. First, a patentee can become his or her own “lexicographer” by clearly setting forth a definition of the disputed term and clearly expressing an intent to define the term. Second, a patentee may disavow the full scope of the claim term either in the specification or during prosecution. To disavow the full scope of a claim term, the patentee’s statements in the specification or prosecuting history must represent a clear disavowal of claim scope. When an applicant’s statements are amendable to multiple reasonable interpretations, they cannot be deemed clear and unmistakable.

12. I understand that, in some cases, the Court may consider extrinsic evidence, such as technical dictionaries, treatises, and expert opinions, to understand the underlying technology and the way in which claim terms would be understood by a POSITA at the relevant time.

13. I further understand that a patentee may draft a patent claim in means-plus-function form. I understand that there is a rebuttable presumption that a claim is in means-plus-function form when the claim language includes “means” or “step for” terms and the corresponding presumption that a claim is not in means-plus-function form in the absence of those terms. However, if the claim term lacks the word “means” or “step for,” I understand that the presumption can be overcome if the challenger demonstrates that the claim term fails to recite sufficiently definite structure or recites function without reciting sufficient structure for performing that function.

14. In addition, I understand that means-plus-function terms are limited to only the structure, materials, or acts described in the specification as corresponding to the claimed function and equivalents thereof. I further understand that construing a means-plus-function term is a two-

step process. First, the function of the means-plus-function limitation is determined. Second, the structure disclosed in the specification corresponding to the function and its equivalents is determined. The structure disclosed in the specification is “corresponding” structure only if the specification or prosecution history clearly links or associates that structure to the function recited in the Claim. The corresponding structure must include all structure that performs the recited function.

15. I understand that patent claims must particularly point out and distinctly claim the subject matter regarded as the invention. I am further informed and understand that a Claim, when viewed in light of the intrinsic evidence, must inform those skilled in the art about the scope of the invention with reasonable certainty. I understand that if it does not, then the claim is invalid as indefinite. Whether a claim is indefinite is determined from the perspective of one of ordinary skill in the art as of the time the application for the patent was filed.

**V. Level of Skill in the Art**

16. Having reviewed the '055 Patent and its Prosecution History, in my opinion, a POSITA would have at least a bachelor's degree in in mechanical or electrical engineering and two to five years of industry experience in designing optical storage devices, disk drives or in a similar field. A POSITA could substitute additional education for experience, e.g., substituting an advanced degree relating to the mechanical design of storage 15 systems, including optical storage devices and drives, for industry experience in a related field and vice versa.

17. Having reviewed the '709 Patent and its Prosecution History, in my opinion, a POSITA would have at least a bachelor's degree in computer science, computer engineering, or a similar field and two years of experience developing software for use with mobile devices.

## **VI. The Technology and Claims of the Asserted Patents**

### **A. The '055 Patent**

18. The '055 Patent is titled “Optical pickup actuator and optical disk drive using the same and method” and generally relates to an optical pickup actuator and optical disc drive using the same. *See* Ex. 2, '055 Patent at Abstract. The '055 Patent names Won-ik Cho, Byung-ryul Ryoo, Young-Pil Park, and No-cheol Park as Inventors, and it issued on September 4, 2007.

#### ***i. The Claims***

19. The '055 Patent contains 45 total claims, 8 independent claims, and 37 dependent claims. I understand that TS-Optics is asserting infringement of claims 1-4, 40, and 42-45.

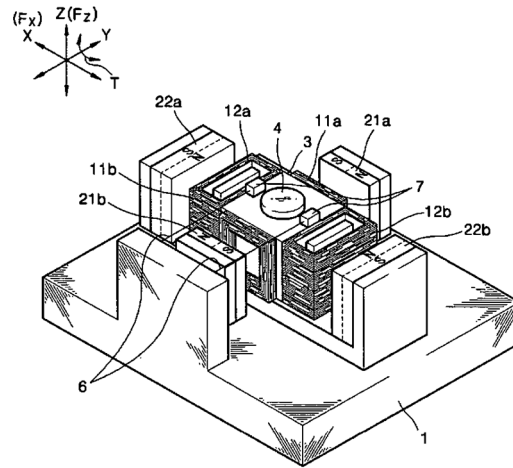
#### ***ii. The Specification and Figures***

20. The specification contains several statements relevant to the construction of the claim Terms in dispute, which are discussed below in connection with the specific terms to be construed.

21. The '055 Patent includes three figures illustrating the perspective view of an optical pickup actuator. Figure 1 shows “a perspective view of a conventional optical pickup actuator.” *Id.* at 5:37-38. Figure 1 from the '055 Patent is reproduced below.

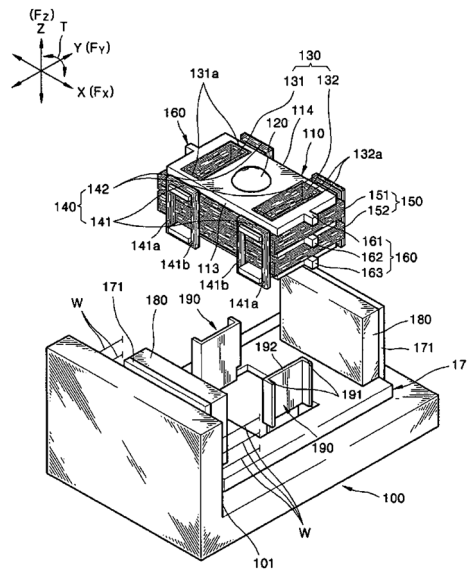


FIG. 1 (PRIOR ART)



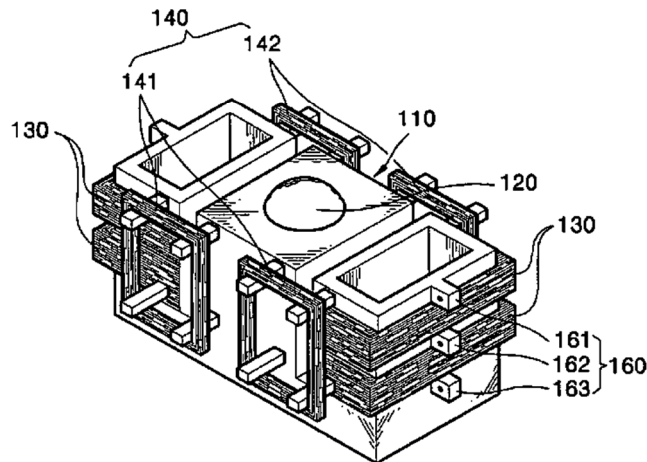
22. Figure 4 is “an exploded perspective view of an optical pickup actuator according to an aspect of the present invention.” *Id.* at 5:43-45. Figure 4 is reproduced below.

FIG. 4



23. Figure 8 “is a perspective view of an optical pickup actuator according to another aspect of this invention.” *Id.* at 5:53-54. Figure 8 from the '055 Patent is reproduced below.

FIG. 8



*iii. The Prosecution History*

24. The application resulting in the '055 Patent was filed on May 20, 2004.

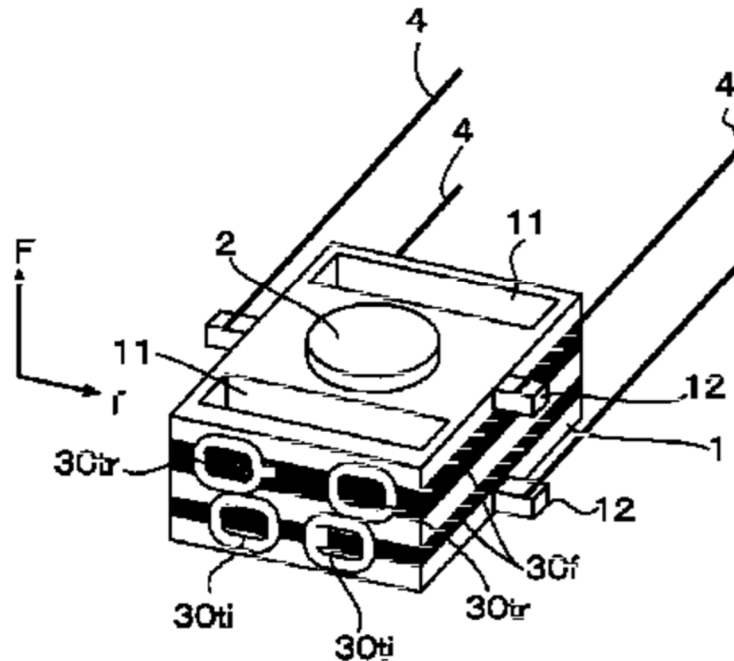
25. I have reviewed the complete prosecution history for the '055 Patent but summarize key events below.

26. On January 5, 2007, the Patent Examiner rejected pending claims 1-7, 11-16, 19, 20, and 25-27 as anticipated by Korean Patent 2002-140828. *See* Ex. 5, Non-Final Office Action (Jan. 5, 2007), at 3. The Patent Examiner also rejected claims 8-10, 17, 18, 21-24, 28-31 “as being dependent upon a rejected base claim[.]” *Id.* at 4.

27. On April 5, 2007, in response to the January 5, 2007, Non-Final Rejection, the applicant stated that the Examiner’s rejection as anticipated by Korean Patent 2002-140828 is a “typographical error - it should read Japanese Patent 2002-140828[.]” *See* Ex. 6, Applicant Arguments/Remarks Made in an Amendment (Apr. 5, 2007), at 10. To overcome the Examiner’s rejection based on anticipated by Japanese Patent 2002-140828, the applicant amended the claims

and stated that “Japanese Patent 2002-140828 teaches that coils 30f are separated from each other in a vertical direction (see FIG.21).” *Id.* However, “coils 30f are not facing each other with respect to the objective lens 2.” *Id.* Figure 21 of Japanese Patent 2002-140828 is reproduced below.

【図21】



28. The applicant also stated that “amended independent claim 1 of the present invention recites that the coil comprises a pair of first coils positioned on the blade in a first direction and facing each other with respect to the objective lens (see FIGs. 4 and 8), which is not taught or suggested by Japanese Patent 2002-140828. Amended independent claim 11, and independent claims 19 and 26 of the present invention, recite the positioning of the pair of first coils in similar fashion.” *Id.*

29. The applicant amended pending claim 1 as follows:

1. (Currently Amended)...wherein the coil is divided into a plurality of subcoils, where each subcoil is separated from an adjacent subcoil in a vertical direction, and

wherein the coil comprises a pair of first coils positioned on the blade in a first direction and facing each other with respect to the objective lens.

*Id.* at 2 (additions underlined in original).

30. The applicant amended pending claim 11 as follows:

11. (Currently Amended)...wherein the coil is divided into a plurality of subcoils, where each subcoil is separated from an adjacent subcoil in a vertical direction, and  
wherein the coil comprises a pair of first coils positioned on the blade in a first direction so as to face each other with respect to the objective lens.

*Id.* at 3-4 (additions underlined in original).

## **B. The '709 Patent**

31. The '709 Patent is titled "MOBILE TERMINAL-BASED VIRTUAL GAME CONTROLLER AND REMOTE CONTROL SYSTEM USING THE SAME" and generally relates to a user controller and to a mobile terminal-based remote control system. *See* Ex. 1, '709 Patent at Abstract. The '709 Patent names Dong Ryeol Shin and Choon Sung Nam as Inventors, and it issued on April 4, 2017.

### ***i. The Claims***

32. The '709 Patent contains 15 total claims, 5 independent claims, and 10 dependent claims. I understand that Defendants are asserting infringement of claims 1-8.

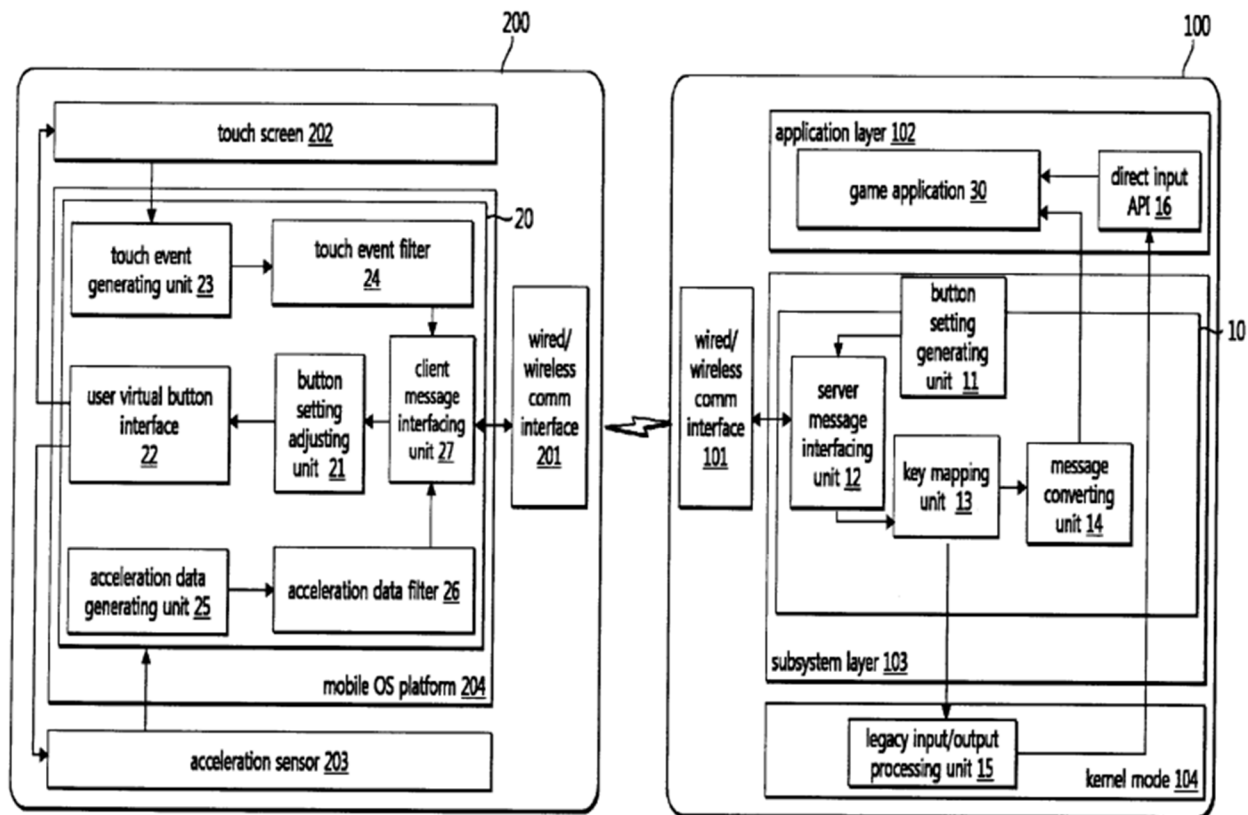
### ***ii. The Specification and Figures***

33. The specification contains several statements relevant to the construction of the claim Terms in dispute, which are discussed below in connection with the specific terms to be construed.

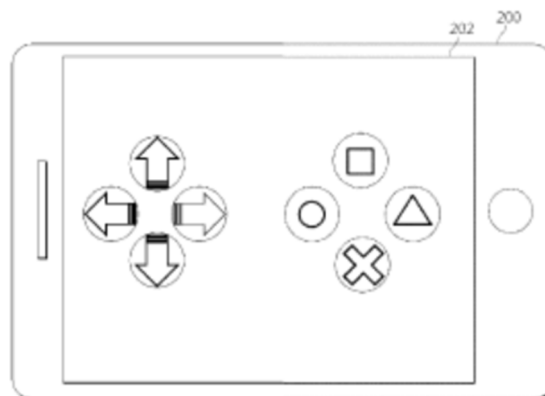
34. The '709 Patent includes three figures. Figure 1 shows "a conceptual diagram illustrating a virtual controller client implemented in a mobile terminal and a virtual controller

server implemented in a personal computer according to an embodiment of the present invention.”

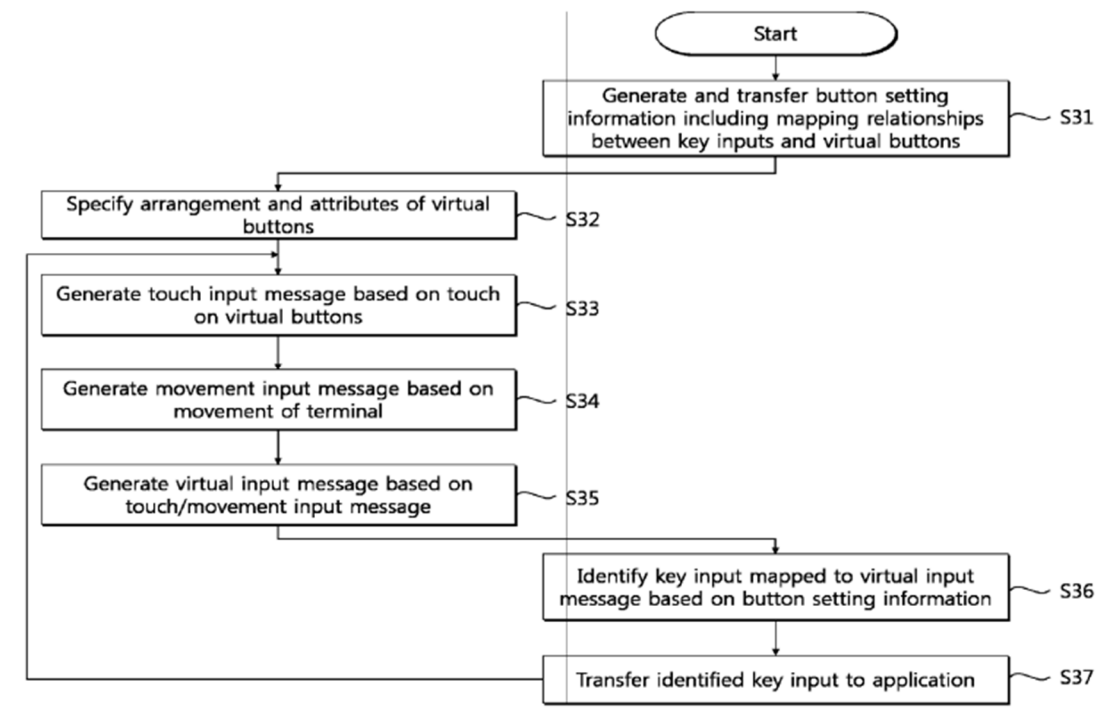
Ex. 1, '709 Patent at 4:30-33. Figure 1 from the '709 Patent is reproduced below.



35. Figure 2 “is a conceptual diagram illustrating an example of the screen of a mobile terminal when a virtual controller is implemented on the mobile terminal according to an embodiment of the present invention.” *Id.* at 4:34-37. Figure 2 is reproduced below.



36. Figure 3 “is a flowchart illustrating a remote controller interfacing method using a virtual controller client implemented on a mobile terminal and a virtual controller server implemented on a personal computer according to an embodiment of the present invention.” *Id.* at 4:38-42. Figure 3 from the ’709 Patent is reproduced below.



### iii. The Prosecution History

37. The application resulting in the ’709 Patent was filed on June 21, 2013.

38. I have reviewed the complete prosecution history for the ’709 Patent but summarize key events below.

39. On January 13, 2016, the Patent Examiner issued a Non-Final Office Action, rejecting pending claims 1-10 as indefinite under 35 U.S.C. § 112(b). *See* Ex. 7, Non-Final Office Action (Jan. 13, 2016), at 2. Specifically, the Examiner stated “Claims 1-10 recite apparatus claims, i.e., a virtual controller client, a virtual controller server, or a remote control system, however, the claims contain elements that are not explicitly recited as structural elements of an

apparatus. For instance, claim 1 recites a button setting adjusting unit, a user virtual button interface, a touch event filter, and a client message interfacing unit, of which none are explicitly defined as structural elements of an apparatus. It is indefinite if these elements are merely program code (not embodied in a particular non-transitory memory device) or are to be interpreted as structural components of the virtual controller client. Similar recitations, such as ‘units’ and ‘filters’ are present in one or more of claims 2-10.” *Id.*

40. In the same Non-Final Office Action, the Patent Examiner also rejected pending claims 1, 3, 4, 6-9, 11, and 13-15 under 35 U.S.C. §102 as anticipated by Porwal (U.S. Patent Application Publication No. 2011/0009195), and claims 2, 5, 10, and 12 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Porwal in view of Ohta et al. (U.S. Patent Application Publication No. 2012/0044177). *See id.* at 3-10.

41. In response, on April 12, 2016, the Applicants amended the claims to be directed to a “mobile terminal” or “computer” rather than a “virtual controller client” or “virtual controller server” (*see* Ex. 8, Amendments to Non-Final Rejection (Apr. 12, 2016)) and argued “that amended claims 1-10 are directed to either a mobile terminal, a computer, or a system which includes physical structures. The written description of the specification also discloses a computer and/or mobile terminal (*see e.g., Figure 1*). Therefore, Applicant kindly requests withdrawal of the rejection of claims 1-10 as being indefinite.” Ex. 9, Arguments/Remarks in Amendment for Non-Final Rejection (Apr. 12, 2016), at 1. To address the § 102 & 103 rejections, the applicant argued that “*Porwal* fails to disclose button setting information including mapping relationship between key inputs to the application and virtual input messages, as presently recited in independent claim 1 and similarly recited in independent claims 4, 9, and 11.” *Id.* at 2.

42. On June 22, 2016, the Patent Examiner sent a Final Rejection, withdrawing the 35 U.S.C. § 112 rejections but maintaining the § 102 & 103 rejections, finding the arguments not persuasive. The Examiner found that Porwal disclosed mapping key inputs to virtual buttons, and that the Applicant’s interpretation of “key inputs” was overly narrow or unclear. Ex. 10, Final Rejection (Jun. 22, 2016), at 3.

43. On September 16, 2016, the Applicant submitted further arguments that were found unpersuasive by the Patent Examiner in an Advisory Action issued on October 26, 2016.

44. On November 23, 2016, Applicants filed a Request for Continued Examination along with further claim amendments which added to the end of each independent claim, the phrase “wherein the mapping relationship redefines the virtual input message associated with a given key input based on an event in the application.” See Ex. 11, Amended Claims after Advisory Action (Nov. 23, 2016).

45. Subsequently, the Patent Examiner issued a Notice of Allowance on January 31, 2017.

## **VII. Disputed Terms of the ’055 Patent**

### **A. Term 1: “facing each other” (claim 1)**

| <b>Term</b>                 | <b>Plaintiff’s Proposed Construction</b>   | <b>Defendant’s Proposed Construction</b> |
|-----------------------------|--------------------------------------------|------------------------------------------|
| facing each other (claim 1) | Plain and ordinary meaning; not indefinite | “disposed opposite each other”           |

46. In my opinion, the plain and ordinary meaning of the claim term “facing each other” as confirmed by intrinsic and extrinsic evidence is “disposed opposite each other.”

47. The term “facing each other” or “face each other” appears in claims 1 and 10 of the ’055 Patent as shown below. I understand that claim 1 is asserted by Plaintiff but claim 10 is not.

1. An optical pickup actuator for use with an objective lens on a base, comprising:



a blade holding the objective lens;  
a plurality of suspension wires supporting the blade on the base so that the blade is elastically movable;  
a magnetic element positioned on the base; and  
a coil positioned horizontally on the blade to generate an electromagnetic force in a focusing and/or tilting direction through an interaction with the magnetic element,  
wherein the coil is divided into a plurality of subcoils, where each subcoil is separated from an adjacent subcoil in a vertical direction, and  
wherein the coil comprises a pair of first coils positioned on the blade in a first direction and **facing each other** with respect to the objective lens.

Ex. 2, '055 Patent at 10:40-55.

10. An optical disc drive for a disc that is a recording medium, comprising:

a spindle motor for rotating the disc;  
an optical pickup for recording and/or reproducing information by emitting light onto the disc through an objective lens; and  
an optical pickup actuator for controlling a position of the objective lens so that the emitted light is focused on a desired position of the disc, the optical pickup actuator comprising:  
a blade holding the objective lens,  
a plurality of suspension wires supporting the blade on a base so that the blade is elastically movable,  
a magnetic element positioned on the base, and  
a coil positioned horizontally on the blade to generate an electromagnetic force in a focusing direction and/or a tilting direction through interaction with the magnetic element,  
wherein the coil is divided into a plurality of subcoils, where each subcoil is separated from an adjacent subcoil in a vertical direction, and  
wherein the coil comprises a pair of first coils positioned on the blade in a first direction so as to **face each other** with respect to the objective lens.

*Id.* at 11:26-49.

48. In my opinion, the way in which the term “facing each other” is used in the claims confirms its plain and ordinary meaning as “disposed opposite each other[.]” For example, the plain language of claims 1 and 10 confirms that (1) there must be a pair of first coils, (2) the pair of coils must be positioned on the blade in a first direction, and (3) that positioning in a first

direction must result in the two coils in the pair facing each other relative to the objective lens. *Id.* at 10:40-55; 11:26-49. In order for the two coils in the pair to face each other relative to the objective lens, a POSITA would understand that the two coils must be “disposed opposite each other,” as Defendant proposes.

49. In my opinion, the way in which the term “facing each other” is used in the specification also confirms its plain and ordinary meaning as “disposed opposite each other[.]” The only instance where the patent uses the terms “facing each other” is in independent claim 1, as written above. The terms “face each other” only appear in two instances in the ‘055 Patent. In the first instance, the specification discloses “[a]ccording to an aspect of the invention, the coil includes a pair of first coils placed on the blade in a first direction to face each other with respect to the objective lens.” *Id.* at 3:59-61. The second instance is where the terms are used in independent claim 40, as shown above. No further disclosures exist to adequately inform a POSITA of what it means for coils to be “facing each other.” From a controls standpoint, it is unclear whether the coils are aligned in such a way that their principal axis of magnetic flux is parallel to or orthogonal to the principal axis of the lens. Because the patent is otherwise silent on this point, it is my opinion that a POSITA would understand the coils to be disposed opposite each other, especially in light of a POSITA’s knowledge and the other evidence discussed herein.

50. In contrast, the specification’s only other disclosures which remotely relate to “a pair of first coils” “facing each other” support the plain and ordinary meaning of the terms as “disposed opposite each other[.]” The only three other disclosures relating to a “pair of first coils” in the specification state: (1) “the optical pickup actuator further includes a pair of **first coils** positioned horizontally on the blade and **disposed opposite each other** with respect to the objective lens in first direction[.]” (2) “a pair of **first coils** positioned horizontally on the blade and

**disposed opposite each other** with respect to the objective lens in first direction,” and (3) “[t]he **first coil** 130 is positioned horizontally on the blade 110 and includes **a pair of coils** 131 and 132 **positioned in an X direction (first direction) symmetrically** with respect to the objective lens 120.” *Id.* at 4:19-21; 4:39-41; and 6:40-44. Consistent with a POSITA’s understanding, these portions of the specification confirm that the coils “facing each other” could only refer to first coils “disposed opposite each other.”

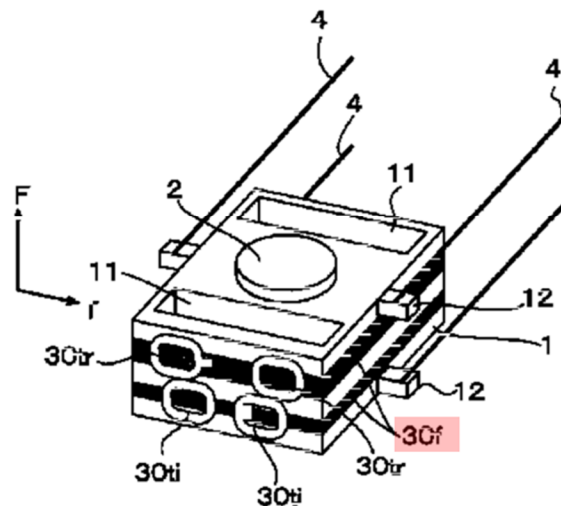
51. In addition, it is my opinion that other claims also confirm a POSITA’s understanding of the term’s plain and ordinary meaning. For example, claims 17 and 24 both refer to a “a pair of first coils positioned horizontally on the blade” which are “disposed opposite each other with respect to the objective lens[.]” *Id.* at 12:11-28; 12:52-13:9. Moreover, when discussing the position of other aspects of the optical pickup actuator, for example a pair of walls or pair of magnets, claims 5, 6, 7, 8, 14, 15, 17, 21, 24, and 28 discuss the position of the other aspects as “disposed opposite” or “disposed opposite each other.” The position of the coils as “disposed opposite each other” is consistent with a POSITA’s understanding of the “facing each other[.]”

52. Beyond this, there is nothing in the intrinsic evidence as to the principal direction of magnetic flux generated by the coils. Because the direction in three-dimensional space of magnetic flux fields generated by coils is critical to the design of any electromagnetic actuator and the intrinsic evidence is silent on such generated fields, it is my opinion that a POSITA would understand the coils to be disposed opposite each other, especially in light of a POSITA’s knowledge and the other evidence discussed herein.

53. The patent prosecution history as described above further support the construction of the term “facing each other” as “disposed opposite each other.” For example, the Examiner rejected the applicant’s proposed claims with language relating to “a coil positioned horizontally

and divided in a vertical direction” as anticipated by Japanese Patent 2002-140828. *See* Ex. 5, Non-Final Office Action (Jan. 5, 2007), at 2. To overcome that rejection, the applicant amended their claims to include the “facing each other” language. Applicant distinguished their proposed invention over the Japanese Patent as having coils 30f that are “facing each other” rather than wrapped around the perimeter of the pickup device/vertically split. *See* Ex. 6, Applicant Arguments/Remarks Made in an Amendment (Apr. 5, 2007), at 10. In contrast to the proposed invention of the ‘055 Patent, Figure 21 (reproduced and annotated below) from Japanese Patent 2002-140828, shows that coils 30f (identified by a red box) are two coils that are wrapped around the perimeter of the optical pickup device and only vertically split (depicted as two striped bands).

【図 21】



54. To further support the alternative construction, it is my opinion that dictionary definitions are consistent with a POSITA’s understanding of the term’s plain and ordinary meaning. For example, the Oxford English Dictionary defines “facing” as something “[t]hat faces or is positioned so as to face; that is opposite to[.]” Ex. 12, OXFORD ENGLISH DICTIONARY, <https://doi.org/10.1093/OED/7343048389> (last visited July 14, 2025). As additional examples, the

Merriam-Webster Dictionary defines “facing” as “located directly across from something” and “opposite[.]” Ex. 13, MERRIAM-WEBSTER DICTIONARY, <https://www.merriamwebster.com/dictionary/facing> (last visited July 14, 2025), and Dictionary.com defines “face-to-face” as “involving close contact or direct opposition.” Ex. 14, DICTIONARY.COM DICTIONARY, <https://www.dictionary.com/browse/faceto-face> (last visited July 14, 2025). These dictionary definitions are consistent with the plain and ordinary meaning of “facing each other” as “disposed opposite each other[.]”

55. I understand that TS-Optics proposes “facing each other” should be given its plain and ordinary meaning but does not identify what it believes constitutes that plain and ordinary meaning. Therefore, I reserve the right to respond to any arguments regarding this term made by TS-Optics or its expert.

**B. Term 2: “unipolar magnets” (claim 40)**

| Term                        | Plaintiff’s Proposed Construction                                                       | Defendant’s Proposed Construction       |
|-----------------------------|-----------------------------------------------------------------------------------------|-----------------------------------------|
| unipolar magnets (claim 40) | Plain and ordinary meaning, which is “magnets that each have a face with a single pole” | indefiniteness based on 35 U.S.C. § 112 |

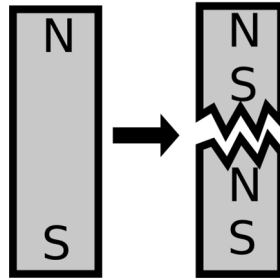
56. In my opinion, the term “unipolar magnets” as recited in claim 40 and in view of the intrinsic evidence fails to inform a POSITA with reasonable certainty about the scope of the invention. Specifically, a POSITA would not understand with reasonable certainty whether there is such a thing as a “unipolar magnet,” and if so, what constitutes a magnet that is “unipolar.”

57. Asserted independent claim 40 requires, in part, “. . . a pair of **unipolar magnets** positioned on the base; and a plurality of coils connected to an electric circuit and interacting with the **unipolar magnets** to create an electromagnet force to move the blade; . . .” Ex. 2, ’055 Patent at 14:27-41. That is, the claim require (1) a pair of unipolar magnets be positioned on the base,

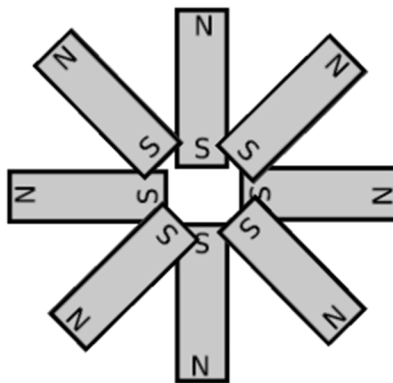
(2) the pair of unipolar magnets interact with a plurality of coils connected to an electric circuit; and (3) that interacting create an electromagnet force to move the blade. *Id.*

58. However, a POSITA would understand that there is no proof that a “unipolar magnet” actually exists. As a POSITA would understand, there is and has been a state of controversy and skepticism in the scientific and engineering communities as to what this term actually implies, if such magnetics can be made, and if one claims such a device, then how, in particular it was constructed. Specifically, it is well understood in the field of magnetism that magnets are bipolar in that they possess a north and south pole. Ex. 15, A. Rajantie, *The search for magnetic monopoles*, 69 PHYSICS TODAY 40, 41 (2016). Yet the concept of a “unipolar magnet” would mean it only has a single pole. *Id.*; see also Ex. 16, OXFORD ENGLISH DICTIONARY, <https://doi.org/10.1093/OED/7328504311> (last visited July 14, 2025); Ex. 17, PTAB-IPR2025-00767, Exhibit 1002 (Declaration of Masud Mansuripur) at ¶ 67. As the literature confirms, the notion of a “unipolar magnet” is indeed a mere notion that is theoretical. Ex. 18, S. Coleman, *The Magnetic Monopole Fifty Years Later* 1-2 (1983). In particular, “no one has observed” a magnetic monopole, and “the absence of monopoles is significant.” Ex. 15, A. Rajantie, *The search for magnetic monopoles*, 69 PHYSICS TODAY 40, 41 (2016). Similarly, Professor Arttu Rajantie also states that “magnets always have two poles—north and south” and, magnetic monopoles only “exist in principle.” *Id.* at 44. As Professor Arttu Rajantie explains, “in practice they cannot be present in the universe today” and there is no confirmation regarding “the existence of real magnetic monopoles.” *Id.* at 44 and 46.

59. Basic physics of magnets that are used in real-world applications dictate that if one breaks a dipole magnet into smaller pieces, those smaller pieces will in turn have north and south poles as seen herein:



60. The only physical incarnation of a *pseudo*-monopole magnetic (i.e., not an actual monopole magnetic) that has been developed for use in engineering devices consists of a collection of dipole magnets arranged such that one common pole is forced into a central position, leaving the other pole facing outwards:



61. Such a pseudo-monopole magnet’s functionality is questionable at best. Further, a pseudo-monopole is actually composed of a plurality of dipole elements, arranged in such a way that applies consistent high force levels to the magnets as they naturally repel each other at the centroid. There is nothing in the specification or the claims that indicate the applicants intended to claim a pseudo-monopole magnetic, which further clouds the scope of the term.

62. No other intrinsic evidence clarifies the scope of the term “unipolar magnets” for a POSITA. For example, neither the specification nor the prosecution history defines the term “unipolar magnet.” Instead, the specification of the ’055 Patent merely states that “the pair of magnets 180 shown in FIGS. 4 and 5 are disposed opposite to each other in a Y direction (second

direction), and are unipolar and magnetized with an N pole.” Ex. 2, ’055 Patent at 6:29-32. It further states that, “[a]lternatively, the magnets 180 are unipolar and magnetized with a S pole according to another aspect of the invention.” *Id.* at 6:32-34. Likewise, Figure 5 (as reproduced and annotated below) illustrates that the magnet only has a north pole. The geometry of the magnetics shown as items 180 look nothing like even a pseudo-monopole magnet. To a POSITA, they appear to be a fiction without any enabling detail at all either in the specification or in the figure.

63. In contrast, Figure 2 (as reproduced and annotated below in yellow) illustrates that a magnet has both a north and south pole. Moreover, the specification only refers to the magnets illustrated in Figure 2 as “magnets” and not “unipolar magnets[.]” *See id.* at 1:48-52 (describing Figure 2: “Magnets 21a, 21b, 22a, and 22b are also mounted on the base 1. While the magnets 21a and 21b are disposed opposite the first coils 11a and 11b, respectively, the magnets 22a and 22b are disposed opposite the second coils 12a and 12b, respectively.”). Clearly, the specification only describes dipole permanent magnets, as these are the kinds of magnets that are ubiquitous in the real world and regularly used in electromagnetic actuators of many classes.



FIG. 2 (PRIOR ART)

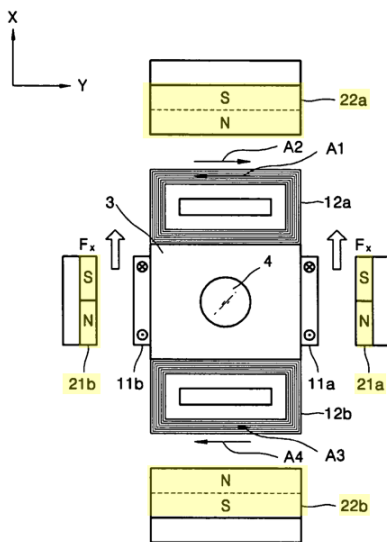
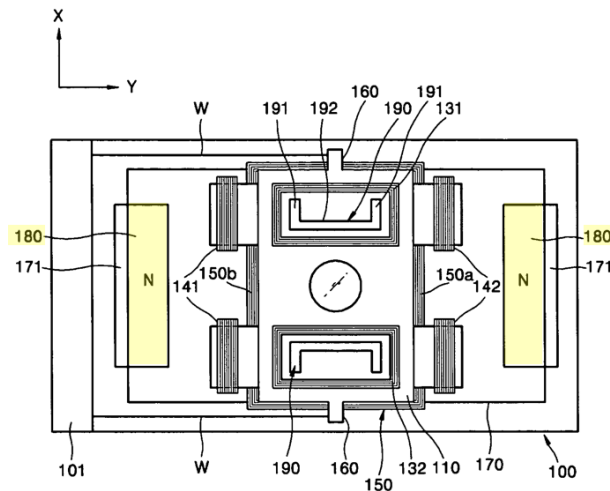


FIG. 5



64. Moreover, the Petition for Inter Partes Review of U.S. Pat. No. 7,266,055 sets forth prior art that explains “all magnets are bipolar, having a north pole and a south pole, and a true unipolar magnet does not exist.” Ex. 19, PTAB-IPR2025-00767, Dkt. 1 (IPR Petition) at 21. This is consistent with a POSITA’s understanding and confirms that a POSITA would not understand the scope of a “unipolar magnet” with reasonable certainty.

65. The extrinsic evidence confirms the problem, too. For example, the Oxford English Dictionary defines “unipolar” as “[p]roduced by or proceeding from a single magnetic pole; exhibiting or employing a single polarity (magnetic or electrical).” Ex. 16, OXFORD ENGLISH DICTIONARY, <https://doi.org/10.1093/OED/7328504311> (last visited July 14, 2025).

66. For at least the reasons set forth above, I am of the opinion that the term “unipolar magnet” fails to inform, with reasonable certainty, those skilled in the art about the scope of the invention and therefore is indefinite.

67. I understand that TS-Optics proposes “unipolar magnet” “should be given its ordinary and accustomed meaning which is “magnets that each have a face with a single pole.” I

disagree with TS-Optics’ proposed construction for several reasons, including because it does not resolve whether TS-Optics believes there is such a thing as a “unipolar magnet” and, if so, what a POSITA would understand the phrase “unipolar magnet” to be. To my understanding, TS-Optics has not explained how a POSITA would understand the scope of the term with reasonable certainty. Thus, I reserve the right to respond to any arguments regarding this term made by TS-Optics or its expert.

# **VIII. Disputed Terms of the ’709 Patent**

## **A. Term 3: “Virtual controller client” (claims 1, 2, 3, 4)**

| Term                                          | Plaintiff’s Proposed Construction | Defendant’s Proposed Construction                                                                                                                                                                                                                                                                                    |
|-----------------------------------------------|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Virtual controller client (claims 1, 2, 3, 4) | Plain and ordinary meaning        | Means plus function<br><br><u>Function:</u><br>“configured to remotely communicate with a virtual controller server running on a computer for remote key input to an application running on the computer”<br><br><u>Structure:</u><br>No corresponding structure disclosed. Therefore, the limitation is indefinite. |

68. In my opinion, “virtual controller client” as claimed in claims 1-4 is a means-plus-function term because, from the perspective of a POSITA, the claim limitation does not recite definite structure that performs the claimed function. It is also my opinion that the specification of the ’709 Patent fails to disclose any structure corresponding to the functions performed by the “virtual controller client,” rendering the term indefinite under 35 U.S.C. § 112, ¶ 2.

69. Beginning with the claim language, the term “virtual controller client” appears, for example, in claim 1 of the ’709 Patent, which recites:

1. A mobile terminal comprising a **virtual controller client** configured to remotely communicate with a virtual controller server running on a computer for remote key input to an application running on the computer, the **virtual controller client** comprising:

a button setting adjusting unit configured to receive first button setting information including a mapping relationship between key inputs to the application and associated virtual input messages, and to specify an arrangement and attributes of virtual buttons based on the received first button setting information;

a user virtual button interface configured to generate a first virtual button screen based on the first button setting information in which touch regions corresponding to the virtual buttons are visually displayed, and to display the first virtual button screen on a touch screen display device of the mobile terminal;

a touch event filter configured to generate touch input messages recognized as key input by the application, based on touch event objects that are generated from touch signals, of the touch regions corresponding to the virtual buttons, among touch signals input by the touch screen; and

a client message interfacing unit configured to convert the touch input message into a virtual input message in a form recognized by the virtual controller server, and to output, to the virtual controller server, the converted touch input message as the virtual input message,

wherein the mapping relationship dynamically redefines the virtual input message associated with a given key input of the key inputs based on an event in the application,

wherein the button setting adjusting unit is configured to receive second button setting information including the dynamically changed virtual message associated with the given key input, and

wherein, in response to an occurrence of the event in the application, the user virtual button interface is configured to generate and display, on the touch screen display device of the mobile terminal, a second virtual button screen based on the second button information.

70. Based on this claim language, a POSITA would understand that the “virtual controller client” is “configured to remotely communicate with a virtual controller server running on a computer for remote key input to an application running on the computer.” In my opinion, this is the function performed by the “virtual controller client.”

71. I understand that the claim language does not use “means” in connection with “virtual controller client” such that there is a rebuttable presumption against construing the term

as a means-plus-function term. But it is my opinion that the claim term fails to recite sufficiently definite structure or else recites function without reciting sufficient structure for performing that function. Specifically, after considering the words of the claims and the intrinsic evidence, and based on my experience, it is my opinion that there is no sufficiently definite structure that a POSITA would understand for the “virtual controller client” and “virtual controller client” does not connote any particular structure or class of structure to a POSITA.

72. In my opinion, a POSITA would not understand “virtual controller client” to connote structure because the term is not a term of art and has no established structural meaning. Based on my education and experience, and after reviewing the intrinsic evidence, it is my opinion that “virtual controller client” does not refer to any particular class of known structures or components either in the technical literature or technical dictionaries. It is also my opinion that the term does not identify any physical circuitry, hardware module, or software architecture with known structure. Rather, “client” in the context of computing and network systems is a generic, functional term typically used to denote a device or program that requests services from a corresponding “server.” On its own, “client” is a common word in the computing field that does not identify any particular structure. *See* Ex. 20 (MICROSOFT COMPUTER DICTIONARY (102) (5th ed. 2002) (defining “client” as “On a local area network or the Internet, a computer that accesses shared network resources provided by another computer (called a server).”)); Ex. 21 (OXFORD ENGLISH DICTIONARY, <https://doi.org/10.1093/OED/1178715870> (last visited July 21, 2025) (defining “client” as “A program used to access a service or data that is provided and managed centrally by a server, esp. over a computer network; a networked computer used to access such a service or data.”)). A “client” has also been defined in industry standard coursework as a computer that gets information from another computer called server in the context of client-server model of

computer networks. The server is often (but not always) on another computer system, in which case the client accesses the service by way of a network. See MICROSOFT OFFICIAL ACADEMIC COURSE, *Exam 70-643: Windows Server 2008 Applications Infrastructure Configuration* (John Wiley & Sons, 1st ed. 2008) (physical copy on file with Dr. Barrett).

73. The use of “virtual controller” as a modifier does not alter this analysis. “Virtual” denotes that the functionality is software-based or emulated rather than physical, and “controller” is also a generic term commonly used to refer to a device or program that performs control-related functions. Taken together, “virtual controller client” is merely a functional label for software that interacts with a server or Wi-fi network to facilitate some type of user control or input. It provides no meaningful structural limitation and is simply a black-box reference to unspecified functionality and unspecified associated components.

74. In addition, the specification treats the term so broadly as to generically be anything that performs the recited function involving downstream or associated components. In particular, the specification describes the “virtual controller client” in general, functional terms, most of which merely parrots the functional claim language and none of which identify any corresponding structure. For example:

- “According to an aspect of the present invention, there is provided a **virtual controller client**, the **virtual controller client** operating based on a mobile terminal so that the **virtual controller client** can remotely communicate with a virtual controller server running on a computer for remote key input on an application running on the computer...” Ex. 1, ’709 Patent at 1:58–64.
- “According to another aspect of the present invention, there is provided a virtual controller server, the virtual controller server operating on a computer so that the virtual controller server can remotely communicate with a **virtual controller client** running on a remote mobile terminal including a touch screen for remoter key input on an application running on the computer.” *Id.* at 2:34-41.
- “a server message interfacing unit configured to transmit a setting message including the button setting information to the **virtual controller client**, and to

receive a virtual input message generated based on a touch on the touch screen from the **virtual controller client**.” *Id.* at 2:46-50.

- “a virtual controller server configured to run on a computer such that it generates button setting information including mapping relationship between key inputs to an application running on the computer and virtual input messages, transfers the button setting information to a **virtual controller client**, extracts a key input from a virtual input message received from the **virtual controller client**, and provides the key input to the application; and a **virtual controller client** configured to remotely communicate with the computer, configured to run on a mobile terminal including a touch screen, and configured to specify an arrangement and attributes of virtual buttons based on the button setting information received from the virtual controller server, to generate a virtual button screen in which touch regions corresponding to the virtual buttons are visually displayed on the touch screen of the mobile terminal, to generate a touch input message that can be recognized as a key input by the application, based on touch event objects generated based on touch signals for regions corresponding to the virtual buttons, which belong to touch signals input via the touch screen, and to convert the touch input message into a virtual input message in a form that can be recognized by the virtual controller server and output the virtual input message.” *Id.* at 3:1-24.
- “the **virtual controller client** may operate such that it activates an acceleration sensor of the mobile terminal so that movements corresponding to the virtual buttons can be detected, generates a movement input message that can be recognized as a key input by the application, based on acceleration data that is generated based on an acceleration signal generated by the acceleration sensor, and converts the touch input message or movement input message into a virtual input message in a form that can be received by the virtual controller server and then outputs the virtual input message. According to still another aspect of the present invention, there is provided a remote controller interfacing method, the remote controller interfacing method using a virtual controller server running on a computer and a **virtual controller client** running based on a remote mobile terminal including a touch screen in order to perform key input on an application running on the computer, the remote controller interfacing method including: generating, by the virtual controller server, button setting information including mapping relationship between key inputs required by the application and virtual input messages to be transmitted by the **virtual controller client**, and transferring, by the virtual controller server, the button setting information to the **virtual controller client**; specifying, by the **virtual controller client**, an arrangement and attributes of virtual buttons based on the button setting information, and displaying, by the **virtual controller client**, a virtual button screen in which virtual button regions are visually arranged on the touch screen; generating, by the **virtual controller client**, touch event objects based on a touch signal generated by the touch screen, and generating, by the **virtual controller client**, a touch input message based on the valid touch event objects; outputting, by the **virtual controller client**, a virtual input message generated based on the touch input message...” *Id.* at 3:27-62.

- “FIG. 1 is a conceptual diagram illustrating a **virtual controller client 20** implemented in a mobile terminal 200 and a virtual controller server 10 implemented in a personal computer 100 according to an embodiment of the present invention. Referring to FIG. 1, the virtual controller server 10 is executed as a background task in the personal computer 100, on which a game application 30 to be controlled is running, and the **virtual controller client 20** is executed as a foreground task in the mobile terminal 200.” *Id.* at 4:58-67.
- “The virtual controller server 10 generates button setting information including mapping relationship between key inputs, required by the game application 30, for example, directional key inputs related to the movement of a game character, direction key inputs related to the gaze direction of a game character, operation key inputs related to the actions of a game character, and function key inputs related to the playing of a game, and virtual input messages to be transmitted from the **virtual controller client 20**. It also transfers a setting message encapsulating the button setting information to the **virtual controller client 20** of the mobile terminal 200, extracts a key input intended by a gamer from a virtual input message received from the **virtual controller client 20**, and provides information about the key input to the game application 30.” *Id.* at 5:14-29.
- “The mobile terminal 200 may include a wired/wireless communication interface 201, a touch screen 202 configured to display a virtual button Screen to a user and to generate a touch signal based on a location touched by a user, an acceleration sensor 203 configured to generate an acceleration signal in response to the tilt or movement of the mobile terminal 200 in a 3 dimensional space, and a mobile OS platform 204 on which the **virtual controller client 20** runs. The **virtual controller client 20** runs on the mobile OS platform 204, and may extract the button setting information from the setting message transferred from the virtual controller server 10 of the personal computer 100 via the wired/wireless communication interface 201, generate a virtual button screen according to the extracted button setting information, and display the virtual button screen on the touch screen 202. Thereafter, the **virtual controller client 20** generates a virtual input message for the game application 30 in an integrated manner, based on a touch input message, generated by the touch screen 202 that identifies a location where a user has performed a touch operation on a displayed virtual button screen, and a movement input message, generated by the acceleration sensor 203 that detects movement when a user moves the mobile terminal 200. For this purpose, the **virtual controller client 20** may include a button setting adjusting unit 21, a user virtual button interface 22, a touch event generating unit 23, a touch event filter 24, an acceleration data generating unit 25, an acceleration data filter 26, and a client message interfacing unit 27. In an embodiment, more than one single **virtual controller client 20** may be connected to a single virtual controller server 10. In this case, the virtual controller server 10 may bind virtual input messages input from a plurality of **virtual controller clients 20** and then provide the virtual input messages to the application 30.” *Id.* at 5:38-6:6.
- “The operations of the virtual controller server 10 and the **virtual controller client 20** will be sequentially described below. First, a gamer runs the virtual controller



server 10 and the application 30 on the personal computer 100, then runs the **virtual controller client 20** on the mobile terminal 200, and manipulates the personal computer 100 and the mobile terminal 200 to recognize each other on a single wired/wireless network via the wired/wireless communication interfaces 101 and 201.” *Id.* at 6:13-22.

- “From the point of view of the application 30, the key input based on the virtual input message generated and provided by the **virtual controller client 20** is indistinguishable from the key input generated by a keyboard or a mouse installed in the actual personal computer 100.” *Id.* at 8:43-47.

75. The specification also describes functional blocks that may be included in the “virtual controller client” but do not connote any structure either. Such functional blocks include:

- “button setting adjusting unit,”
- “user virtual button interface,”
- “touch event generating unit,”
- “touch event filter,”
- “acceleration data generating unit,”
- “acceleration data filter,” and
- “client message interfacing unit.”

*Id.* at 5:52–6:6.

76. In my opinion, these blocks are themselves lacking any structure for implementing their functions. As just one example, and as discussed further in Section VIII(B) below, a “button setting adjusting unit” is also known only by its function without any corresponding structure or enabling features. Thus, listing these functional blocks that may be include in the “virtual controller client” do not constitute corresponding structure.

77. Only Figure 1 (reproduced below) purports to show the “virtual controller client” as client 20. Client 20 is illustrated by a box within mobile terminal 200. Figure 1 provides no detail regarding any structure for the “virtual controller client.” Other figures, such as Figure 3 (also reproduced below), likewise merely illustrate the sequence of functions performed by the “virtual controller client” without disclosing any structure to perform those functions.



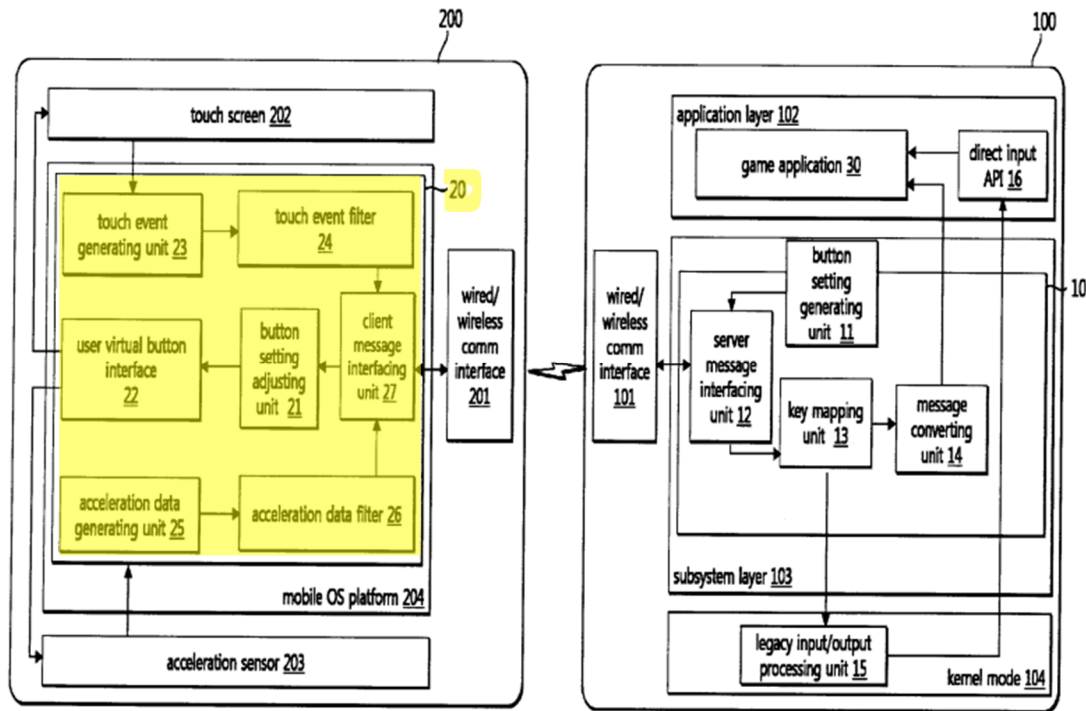


Fig. 1 of the '709 Patent (annotations added).

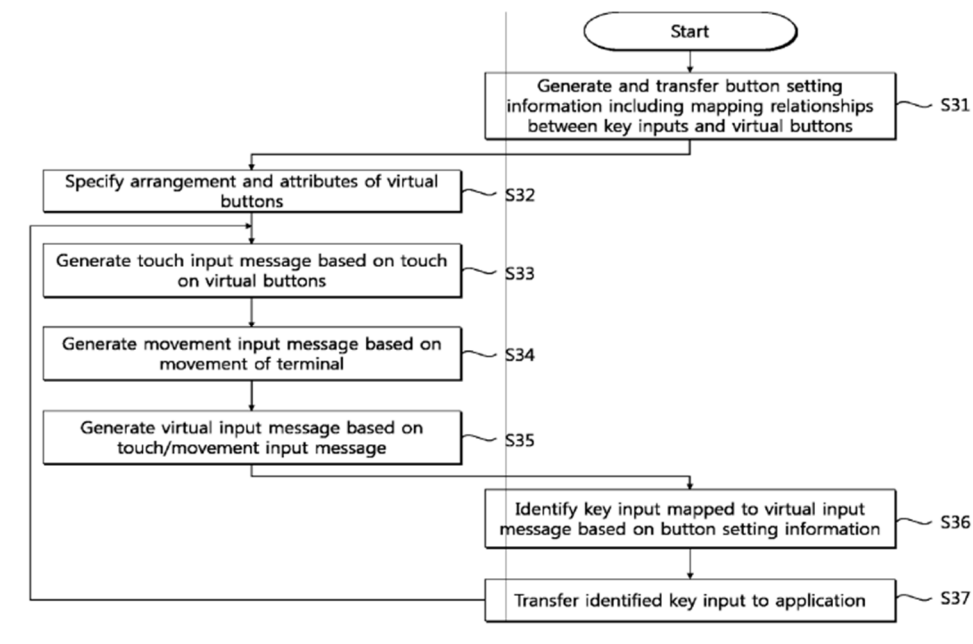


Fig. 3 of the '709 Patent.

78. Figure 1 also contains a conflict in the form of data flow and component connectivity. Figure 1 shows overlapping lines and boundaries and a troubling gap in data flow.

From the specification: “Furthermore, when a gamer tilts or moves the mobile terminal 200, the acceleration sensor 203 generates an acceleration signal. The generated acceleration signal is input to the acceleration data generating unit 25 and processed so as to be valid acceleration data.” *Id.* at 8:4-8. When one examines Figure 1, there is a conflict in the data flow from the acceleration sensor 203. Specifically, the data goes to the virtual controller client 20, not to the accelerating data generating unit 25 (see below). Additionally, there is no data input to the acceleration data generating unit 25, meaning that no data will be sent to the acceleration data filter 26 which affects the entire downstream process. This fundamental error in the block diagram lends a high degree of uncertainty as to the data flow. Given this problem, the entire loop will be running on erroneous or nonexistent data, potentially rendering the entire device nonfunctional.

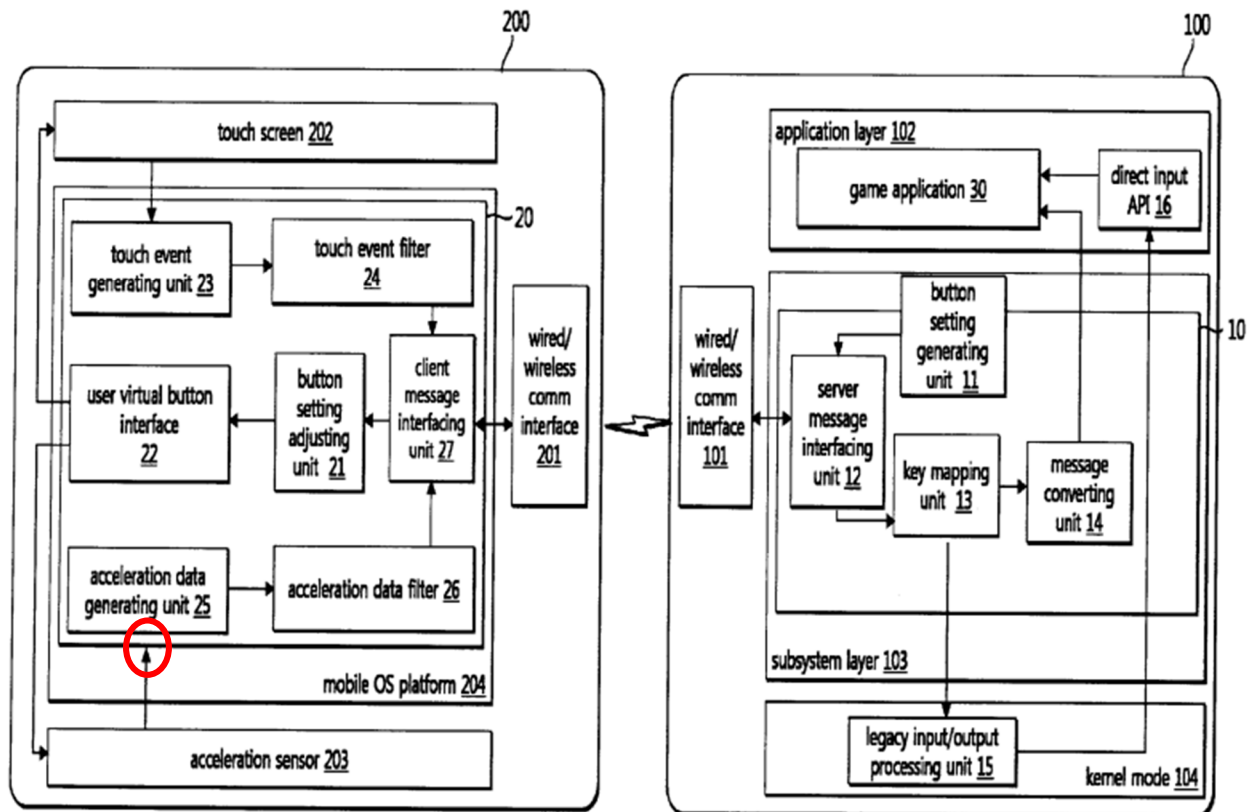


Fig. 1 of the '709 Patent (annotations added).

79. In addition, the specification does not disclose source code, algorithms, data structures, or architectural details for performing the claimed function. These are critical for any meaningful understanding of how the device is designed and used.

80. Therefore, because (1) a POSITA would not understand “virtual controller client” to recite sufficiently definite structure or (2) a POSITA would understand “virtual controller client” to recite function without reciting sufficient structure for performing the function, I understand that the term “virtual controller client” is properly construed as a means-plus-function term.

81. Having determined that the term “virtual controller client” is properly construed as a means-plus-function term, it is my opinion, the function of “virtual controller client” is “to remotely communicate with a virtual controller server running on a computer for remote key input to an application running on the computer.” This is apparent from the plain language of the claim and the specification as discussed above and expressly incorporated here.

82. As to the structure corresponding to that function, it is my opinion that the specification does not disclose sufficient structure that corresponds to the claimed invention. For the reasons discussed above, which are expressly incorporated here, it is my opinion that there is no structure or algorithm disclosed. Instead, the specification only recites functional language that adds nothing beyond the functional language already present in the claim language.

83. Thus, because there is insufficient structure corresponding to the claimed function, it is my opinion that the “virtual controller client” term is indefinite and, thus, the claims reciting the term are invalid.

**B. Term 4: “Button setting adjusting unit” (claim 1)**

| Term                                    | Plaintiff’s Proposed Construction | Defendant’s Proposed Construction                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Button setting adjusting unit (claim 1) | Plain and ordinary meaning        | <p>Means plus function</p> <p><u>Function:</u><br/> “configured to receive first button setting information ... and to specify an arrangement and attributes of virtual buttons based on the received first button setting information ... [and] configured to receive second button setting information.”</p> <p><u>Structure:</u><br/> No corresponding structure disclosed. Therefore, the limitation is indefinite.</p> |

84. In my opinion, “button setting adjusting unit” as claimed in claim 1 is a means-plus-function term because, from the perspective of a POSITA, the claim limitation does not recite definite structure that performs the claimed function. It is also my opinion that the specification of the ’709 Patent fails to disclose any structure corresponding to the functions performed by the “button setting adjusting unit,” rendering the term indefinite under 35 U.S.C. § 112, ¶ 2.

85. Beginning with the claim language, the term “button setting adjusting unit” appears in claim 1 of the ’709 Patent as follows:

1. A mobile terminal comprising a virtual controller client configured to remotely communicate with a virtual controller server running on a computer for remote key input to an application running on the computer, the virtual controller client comprising:

a **button setting adjusting unit** configured to receive first button setting information including a mapping relationship between key inputs to the application and associated virtual input messages, and to specify an arrangement and attributes of virtual buttons based on the received first button setting information;

a user virtual button interface configured to generate a first virtual button screen based on the first button setting information in which touch regions corresponding

to the virtual buttons are visually displayed, and to display the first virtual button screen on a touch screen display device of the mobile terminal;

a touch event filter configured to generate touch input messages recognized as key input by the application, based on touch event objects that are generated from touch signals, of the touch regions corresponding to the virtual buttons, among touch signals input by the touch screen; and

a client message interfacing unit configured to convert the touch input message into a virtual input message in a form recognized by the virtual controller server, and to output, to the virtual controller server, the converted touch input message as the virtual input message,

wherein the mapping relationship dynamically redefines the virtual input message associated with a given key input of the key inputs based on an event in the application,

wherein the **button setting adjusting unit** is configured to receive second button setting information including the dynamically changed virtual message associated with the given key input, and

wherein, in response to an occurrence of the event in the application, the user virtual button interface is configured to generate and display, on the touch screen display device of the mobile terminal, a second virtual button screen based on the second button information.

86. Based on this claim language, a POSITA would understand that the “button setting adjusting unit” is (1) “configured to receive first button setting information including a mapping relationship between key inputs to the application and associated virtual input messages”; (2) “configured ... to specify an arrangement and attributes of virtual buttons based on the received first button setting information”; and (3) “further configured to receive second button setting information.” In my opinion, these are the functions performed by the “button setting adjusting unit.”

87. I understand that the claim language does not use “means” in connection with “button setting adjusting unit” such that there is a rebuttable presumption against construing the term as a means-plus-function term. But it is my opinion that the claim term fails to recite sufficiently definite structure or else recites function without reciting sufficient structure for

performing that function. Specifically, after considering the words of the claims and the intrinsic evidence, and based on my experience, it is my opinion that there is no sufficiently definite structure that a POSITA would understand for the “button setting adjusting unit,” and “button setting adjusting unit” does not connote any particular structure or class of structure to a POSITA.

88. In my opinion, a POSITA would not understand “button setting adjusting unit” to connote structure because the term is not a term of art and has no established structural meaning. Rather, it simply describes the function of adjusting the setting of a button—without specifying how that function is achieved or what particular structural components are involved. In my experience, and in the experience of a POSITA at the time of the invention, the term “unit” is often used as a generic, non-structural placeholder. In my opinion, the phrase is merely as a black-box functional label. The addition of “button setting adjusting” merely describes what the “unit” is intended to do.

89. In my opinion, the term “button setting adjusting unit” is purely functional in nature. It conveys the result to be achieved—i.e., adjusting the setting of a button—but provides no information about how that result is accomplished. A POSITA would not be able to identify any particular structure or class of structures from the claim language alone. The claim offers no physical limitations, parameters, or implementation details of the “unit.” Thus, the term fails to provide sufficient structural guidance on its face.

90. In addition, the specification of the '709 Patent refers to the "button setting adjusting unit" in broad, functionally defined terms and does not describe any corresponding structure that performs the claimed function. It fails to provide any detailed description or embodiment of the structure that performs the claimed function of adjusting button settings. For example, although the term “button setting adjusting unit” may be referenced in a general or

conceptual sense in the written description, the specification does not associate it with any clearly identifiable hardware component, mechanical linkage, circuitry, or algorithm. Instead, the specification refers to this term only in functional terms—such as enabling a user to modify a button setting or select among predefined configurations—without describing how the adjustment is carried out structurally or mechanically. For instance, the specification describes the “button setting adjusting unit” as follows:

- “a **button setting adjusting unit** configured to receive button setting information including mapping relationship between key inputs to the application and virtual input messages from the virtual controller server, and to specify an arrangement and attributes of virtual buttons based on the received button setting information.” Ex. 1, ’709 Patent at 1:65-2:4.
- “For this purpose, the virtual controller client 20 may include a **button setting adjusting unit 21**, a user virtual button interface 22, a touch event generating unit 23, a touch event filter 24, an acceleration data generating unit 25, an acceleration data filter 26, and a client message interfacing unit 27.” *Id.* at 5:62-66.
- “Furthermore, the button setting information may be dynamically changed while playing a game. For example, to make a progress in a game, sometimes a character needs to move in a field and in another time a character needs to grow up. Those cases may require different game interfaces. In these cases, the virtual controller server 10 may dynamically change the button setting information in accordance with a game environment and apply on-the-fly the changed button setting information to the virtual controller client 20.” *Id.* at 6:61-7:2.
- “The button setting information received via the wired/wireless communication interface 201 of the mobile terminal 200 is transferred to the **button setting adjusting unit 21**. The **button setting adjusting unit 21** may generate the virtual button setting information by specifying the arrangement and attributes of virtual buttons that will generate virtual input messages that should be provided to the virtual controller server 10 by the virtual controller client based on the button setting information. The **button setting adjusting unit 21** may specify the arrangement or attributes of buttons as previously predetermined or in accordance with the intention of a gamer. For example, the **button setting adjusting unit 21** may generate the virtual button setting information so that a relatively wide touch region on the left side of a virtual button screen is mapped to four direction keys related to the movement of a game character, a plurality of relatively small touch regions on the right side of the virtual button Screen are mapped to an operation key related to the operation of the game character and function keys related to the playing of a game, and the direction of movement of the mobile terminal 200 is mapped to a game character gaze direction key.” *Id.* at 7:8-30.

91. In my opinion, there is no identifiable “corresponding structure” in the specification of the ’709 Patent that would inform a POSITA how the claimed function of “adjusting the button setting” is performed.

92. The only figure that purports to illustrate the “button setting adjusting unit” is Figure 1 (reproduced below), which shows a box labeled “button setting adjusting unit” with arrows indicating the process flow. Figure 1 provides no depiction or explanation of internal structure, process flow, data tables, logic, or algorithms. In my opinion, a POSITA would not derive any meaningful structural detail from such a generic diagram.

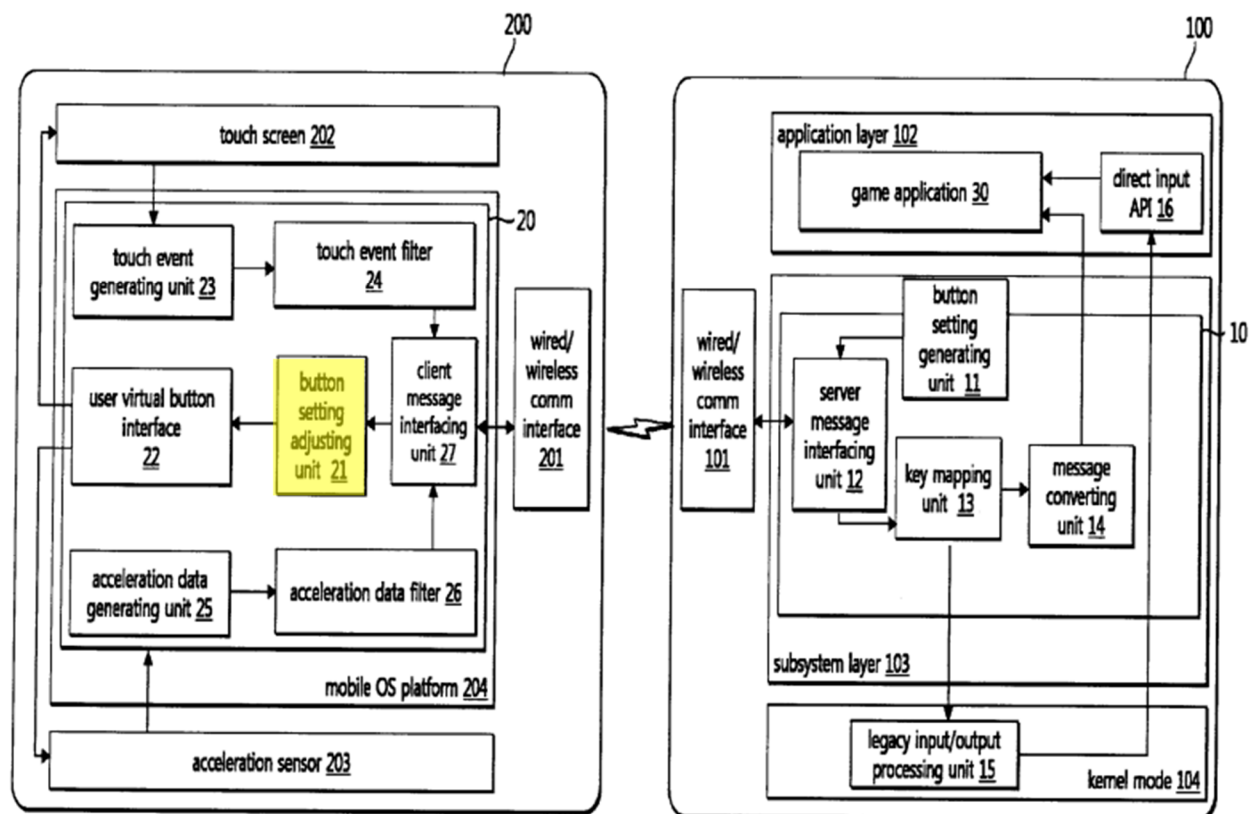


Fig. 1 of the ’709 Patent (annotations added).

93. In addition, the specification lacks any diagrams, schematics, or detailed descriptions that illustrate or describe a physical component or means by which such an adjustment is implemented and therefore fails to inform a POSITA of the specific structure associated with



the "button setting adjusting unit." There is also no description of materials, shapes, interconnections, control logic, or operation that would qualify as adequate corresponding structure.

94. Therefore, because (1) a POSITA would not understand "button setting adjusting unit" to recite sufficiently definite structure or (2) a POSITA would understand "button setting adjusting unit" to recite function without reciting sufficient structure for performing the function, I understand that the term "button setting adjusting unit" is properly construed as a means-plus-function term.

95. Having determined that the term "button setting adjusting unit" is properly construed as a means-plus-function term, it is my opinion, the function of "button setting adjusting unit" is "to receive first button setting information ... and to specify an arrangement and attributes of virtual buttons based on the received first button setting information ... [and] to receive second button setting information." This is apparent from the plain language of the claim and the specification as discussed above and expressly incorporated here.

96. As to the structure corresponding to that function, it is my opinion that the specification does not disclose sufficient structure that corresponds to the claimed invention. For the reasons discussed above, which are expressly incorporated here, it is my opinion that there is no structure or algorithm disclosed. Instead, the specification only recites functional language that adds nothing beyond the functional language already present in the claim language.

97. Thus, because there is insufficient structure corresponding to the claimed function, it is my opinion that the "button setting adjusting unit" term is indefinite and, thus, the claims reciting the term are invalid.

**C. Term 5: “User virtual button interface” (claims 1 and 2)**

| Term                                           | Plaintiff’s Proposed Construction | Defendant’s Proposed Construction                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------------------------------------|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| User virtual button interface (claims 1 and 2) | Plain and ordinary meaning        | <p>Means plus function</p> <p><u>Function:</u><br/> “configured to generate a first virtual button screen based on the first button setting information ... and to display the first virtual button screen on a touch screen display device of the mobile terminal ... [and] in response to an occurrence of the event in the application, ... configured to generate and display, on the touch screen display device of the mobile terminal, a second virtual button screen based on the second button information..” Additionally, the recited function may include “activat[ing] an acceleration sensor of the mobile terminal to enable a detection of movements of the mobile terminal.”</p> <p><u>Structure:</u><br/> No corresponding structure disclosed. Therefore, the limitation is indefinite.</p> |

98. In my opinion, “user virtual button interface” as claimed in claims 1 and 2 of the ’709 Patent is a means-plus-function term because, from the perspective of a POSITA, the claim limitation does not recite definite structure that performs the claimed function. It is also my opinion that the specification of the ’709 Patent fails to disclose any structure corresponding to the functions performed by the “virtual controller client,” rendering the term indefinite under 35 U.S.C. § 112, ¶ 2.

99. The term “user virtual button interface” appears in independent claim 1 as follows:

1. A mobile terminal comprising a virtual controller client configured to remotely communicate with a virtual controller server running on a computer for remote key input to an application running on the computer, the virtual controller client comprising:

a button setting adjusting unit configured to receive first button setting information including a mapping relationship between key inputs to the application and associated virtual input messages, and to specify an arrangement and attributes of virtual buttons based on the received first button setting information;

a **user virtual button interface** configured to generate a first virtual button screen based on the first button setting information in which touch regions corresponding to the virtual buttons are visually displayed, and to display the first virtual button screen on a touch screen display device of the mobile terminal;

a touch event filter configured to generate touch input messages recognized as key input by the application, based on touch event objects that are generated from touch signals, of the touch regions corresponding to the virtual buttons, among touch signals input by the touch screen; and

a client message interfacing unit configured to convert the touch input message into a virtual input message in a form recognized by the virtual controller server, and to output, to the virtual controller server, the converted touch input message as the virtual input message,

wherein the mapping relationship dynamically redefines the virtual input message associated with a given key input of the key inputs based on an event in the application,

wherein the button setting adjusting unit is configured to receive second button setting information including the dynamically changed virtual message associated with the given key input, and

wherein, in response to an occurrence of the event in the application, the **user virtual button interface** is configured to generate and display, on the touch screen display device of the mobile terminal, a second virtual button screen based on the second button information.

100. Claim 2 recites an additional function of the “user virtual button interface:”

2. The mobile terminal of claim 1, wherein:

the **user virtual button interface** activates an acceleration sensor of the mobile terminal to enable a detection of movements of the mobile terminal, and the virtual controller client further comprises:

an acceleration data filter configured to generate a movement input message that is mapped to a key input of the application, based on acceleration data that is generated based on acceleration signal generated by the acceleration sensor; and

the client message interfacing unit operable to convert the touch input message or the movement input message into a virtual input message in a form recognized by the virtual controller server.

101. Based on this claim language, a POSITA would understand that the “user virtual button interface” is (1) “configured to generate a first virtual button screen based on the first button setting information based on the first button setting information in which touch regions corresponding to the virtual buttons are visually displayed” and (2) “configured ... to display the first virtual button screen on a touch screen display device of the mobile terminal” and (3) “in response to an occurrence of the event in the application, ... configured to generate and display, on the touch screen display device of the mobile terminal, a second virtual button screen based on the second button information.” Additionally, the “user virtual button interface” also, for the purpose of claim 2, (4) “activates an acceleration sensor of the mobile terminal to enable a detection of movements of the mobile terminal.” In my opinion, these are the functions performed by the “user virtual button interface.”

102. I understand that the claim language does not include the word “means,” such that there is a rebuttable presumption against construing the term as a means-plus-function term. But, it is my opinion that the claim term fails to recite sufficiently definite structure or else recites function without reciting sufficient structure for performing that function. Specifically, after considering the words of the claims and the intrinsic evidence, and based on my experience, it is my opinion that there is no sufficiently definite structure that a POSITA would understand for the “user virtual button interface” and “user virtual button interface” does not connote any particular structure or class of structure to a POSITA.

103. In my opinion, a POSITA would not understand “user virtual button interface” to connote structure because the term is not a term of the art and has no established structural meaning. Based on my education and experience, and after reviewing the intrinsic evidence, it is my opinion that “user virtual button interface” does not refer to a particular class of known structures or components.

104. It is my opinion that a POSITA would understand that the term is a nonce phrase that merely recites the function to be performed, without connoting sufficiently definite structure. In my experience and understanding, the term “interface” is a generic and commonly used placeholder that does not inherently convey structure. In the context of computer-related inventions, “interface” typically refers to a broad category of software or hardware that enables interaction or communication—without suggesting any specific structural limitations or implementation.

105. In my opinion, each of these recitations describes functionality only. The phrase “user virtual button interface” does not recite any particular structure capable of carrying out the functions described. Rather, it serves merely as a verbal construct to carry the recited functionality absent of any indication of structure.

106. Further, in my opinion, the use of the word “user” or the modifiers “virtual” and “button” does not supply the requisite structure. These modifiers only describe the context in which the function is carried out—a virtual button system operated by a user—but they do not transform “interface” into a term denoting structure.

107. Therefore, in my opinion, a POSITA would understand that “user virtual button interface” is a purely functional term with no indication of structure and should be interpreted as a means-plus-function term under § 112, ¶ 6.

108. In my opinion, the functions associated with the “user virtual button interface” in claims 1 and 2 of the ’709 Patent include at least the following:

- Generating a first virtual button screen based on the first button setting information;
- Displaying that first virtual button screen on a touch screen display of a mobile terminal;
- Generating and displaying a second virtual button screen based on second button information, in response to an event;
- Activating an acceleration sensor of the mobile terminal to enable detection of movement.

109. Each of these functions involves dynamic user interface behavior, graphical rendering, event-triggered updates, and sensor activation. A POSITA would understand these are high-level software tasks that require specific programming logic or algorithms to implement. In my opinion, the term “interface” in this context functions merely as a label for these operations, without im-parting or connoting structure for executing them.

110. Having determined that the claim term is governed by § 112, ¶ 6, the next step is to identify whether the ’709 Patent discloses sufficient corresponding structure that is clearly linked to performing each of the recited functions. In my opinion, it does not.

111. The ’709 Patent describes the “user virtual button interface” so broadly as to generically be anything that performs the recited function. In particular, the specification describes the “user virtual button interface” in general, functional terms, most of which merely parrots the functional claim language and none of which identify any corresponding structure. For example:

- “a **user virtual button interface** configured to generate a virtual button Screen in which touch regions corresponding to the virtual buttons are visually displayed, and to display the virtual button screen on a touch screen of the mobile terminal.” Ex. 1, ’709 Patent at 2:4–8.
- “The **user virtual button interface** may activate an acceleration sensor of the mobile terminal so that movements of the mobile terminal can be detected.” *Id.* at 2:20-22.

- “For this purpose, the virtual controller client 20 may include a button setting adjusting unit 21, a **user virtual button interface 22**, a touch event generating unit 23, a touch event filter 24, an acceleration data generating unit 25, an acceleration data filter 26, and a client message interfacing unit 27.” *Id.* at 5:62-67.
- “The **user virtual button interface 22** generates a virtual button screen on which touch regions corresponding to virtual buttons are visually displayed in accordance with the virtual button setting information, displays the virtual button screen on the touch screen 202, and activates the acceleration sensor 203 corresponding to the virtual buttons.” *Id.* at 7:31-36.

112. But neither the claims nor the specification disclose how any of these functions are implemented; there is no corresponding structure disclosed, such as an algorithm, flowchart, source code, or even a reference to a conventional software module or known user interface system that could serve to implement the claimed operations.

113. Figures 1 (reproduced below) is the only figure purporting to depict the “user virtual button interface.” However, Figure 1 does not provide such structural detail either. For instance, Figure 1 merely lists the “user virtual button interface 22” as one of several unnamed components within the virtual controller client 20. That figure does not depict any internal structure, circuitry, or data flows that would inform a POSITA how to perform the required functions.

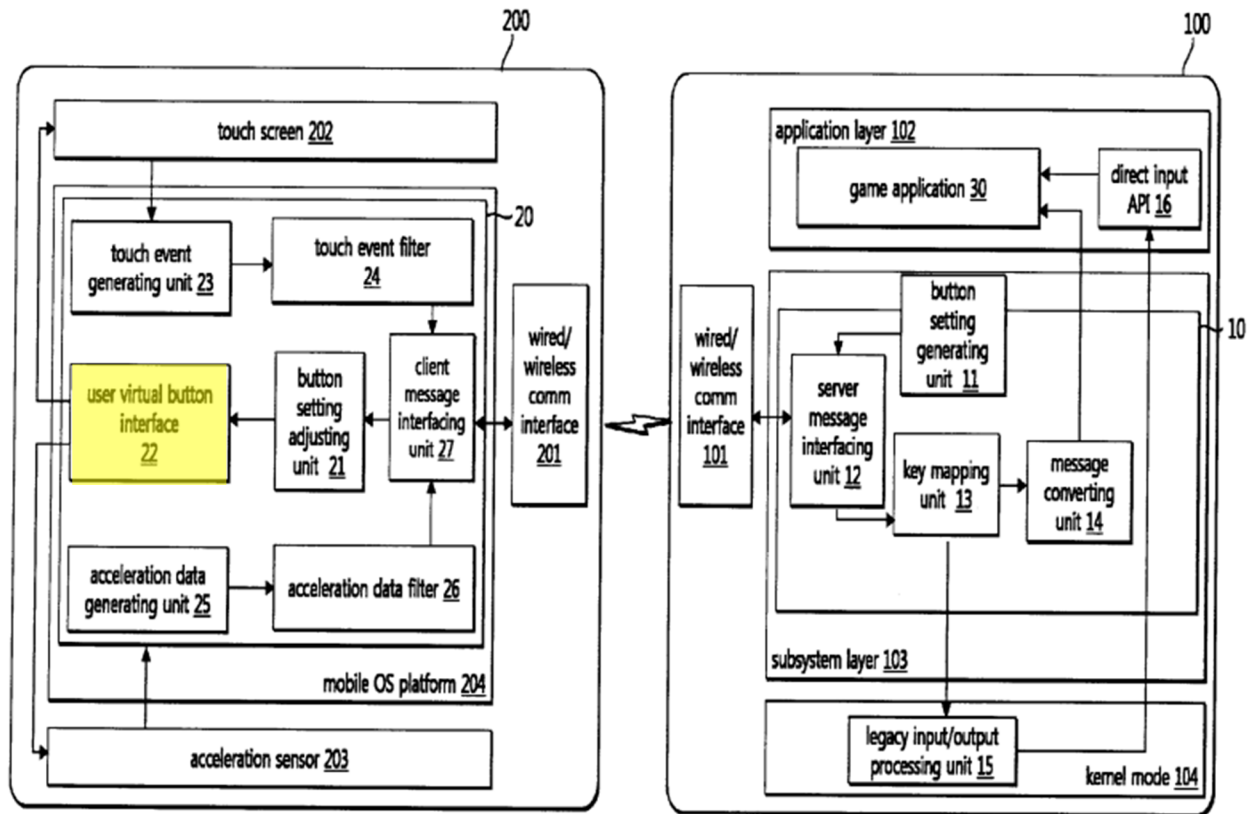


Fig. 1 of the '709 Patent (annotations added).

114. Therefore, because (1) a POSITA would not understand “user virtual button interface” to recite sufficiently definite structure or (2) a POSITA would understand “user virtual button interface” to recite function without reciting sufficient structure for performing the function, I understand that the term “user virtual button interface” is properly construed as a means-plus-function term.

115. Having determined that the term “user virtual button interface” is properly construed as a means-plus-function term, it is my opinion, the function of “user virtual button interface” is “to generate a first virtual button screen based on the first button setting information ... and to display the first virtual button screen on a touch screen display device of the mobile terminal ... [and] in response to an occurrence of the event in the application, ... to generate and display, on the touch screen display device of the mobile terminal, a second virtual button screen



based on the second button information” and additionally may include “to activate an acceleration sensor of the mobile terminal to enable a detection of movements of the mobile terminal.” This is apparent from the plain language of the claim and the specification as discussed above and expressly incorporated here.

116. As to the structure corresponding to that function, it is my opinion that the specification does not disclose sufficient structure that corresponds to the claimed invention. For the reasons discussed above, which are expressly incorporated here, it is my opinion that there is no structure or algorithm disclosed. Instead, the specification only recites functional language that adds nothing beyond the functional language already present in the claim language.

117. Thus, because there is insufficient structure corresponding to the claimed function, it is my opinion that the “user virtual button interface” term is indefinite and, thus, the claims reciting the term are invalid.

**D. Term 6: “Touch event filter” (claim 1)**

| <b>Term</b>                  | <b>Plaintiff’s Proposed Construction</b> | <b>Defendant’s Proposed Construction</b>                                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Touch event filter (claim 1) | Plain and ordinary meaning               | <p>Means plus function</p> <p><u>Function:</u><br/> “configured to generate touch input messages recognized as key input by the application, based on touch event objects that are generated from touch signals, of the touch regions corresponding to the virtual buttons, among touch signals input by the touch screen.”</p> <p><u>Structure:</u><br/> No corresponding structure disclosed. Therefore, the limitation is indefinite.</p> |

118. In my opinion, “touch event filter” as claimed in claim 1 is a means-plus-function term because, from the perspective of a POSITA, the claim limitation does not recite definite structure that performs the claimed function. It is also my opinion that the specification of the ’709 Patent fails to disclose any structure corresponding to the functions performed by the “virtual controller client,” rendering the term indefinite under 35 U.S.C. § 112, ¶ 2.

119. Beginning with the claim language, the term “touch event filter” appears in claim 1 of the ’709 Patent, which recites in relevant part:

1. A mobile terminal comprising a virtual controller client configured to remotely communicate with a virtual controller server running on a computer for remote key input to an application running on the computer, the virtual controller client comprising:

a button setting adjusting unit configured to receive first button setting information including a mapping relationship between key inputs to the application and associated virtual input messages, and to specify an arrangement and attributes of virtual buttons based on the received first button setting information;

a user virtual button interface configured to generate a first virtual button screen based on the first button setting information in which touch regions corresponding to the virtual buttons are visually displayed, and to display the first virtual button screen on a touch screen display device of the mobile terminal;

a **touch event filter** configured to generate touch input messages recognized as key input by the application, based on touch event objects that are generated from touch signals, of the touch regions corresponding to the virtual buttons, among touch signals input by the touch screen; and

a client message interfacing unit configured to convert the touch input message into a virtual input message in a form recognized by the virtual controller server, and to output, to the virtual controller server, the converted touch input message as the virtual input message,

wherein the mapping relationship dynamically redefines the virtual input message associated with a given key input of the key inputs based on an event in the application,

wherein the button setting adjusting unit is configured to receive second button setting information including the dynamically changed virtual message associated with the given key input, and

wherein, in response to an occurrence of the event in the application, the user virtual button interface is configured to generate and display, on the touch screen display device of the mobile terminal, a second virtual button screen based on the second button information.

120. Based on this claim language, a POSITA would understand that the “touch event filter” is “configured to generate touch input messages recognized as key input by the application, based on touch event objects that are generated from touch signals, of the touch regions corresponding to the virtual buttons, among touch signals input by the touch screen.” In my opinion, this is the function performed by the “touch event filter.”

121. I understand that the claim language does not use “means” in connection with “touch event filter” such that there is a rebuttal presumption against construing the term as a means-plus-function term. But it is my opinion that the claim term fails to recite sufficiently definite structure or else recites function without reciting sufficient structure for performing that function. Specifically, after considering the words of the claims and the intrinsic evidence, and based on my experience, it is my opinion that the words “touch event filter” is not a name for any structure in the context of these claims. In terms of device controls, the term “filter” can mean many things from mechanical to physical, low-pass, band-pass, notch-pass, and many others. Each one has a specific meaning and ranges of potential design. The ’709 patent is silent on the type of filter, reinforcing the lack of structural disclosure of the term. In my opinion, the word “touch event filter” does not connote any particular structure or class of structure to a POSITA. Instead, this is a multi-step, computer-implemented process involving the transformation of low-level touch signals into higher-level inputs recognizable by an application and the claim language does not describe any structure for performing this function. Therefore, the claim term should be construed as a means-plus-function term.

122. It is my opinion that a POSITA would not understand “touch event filter” to connote structure because the term is not a term of art and has no established structural meaning. Based on my education and experience, and after reviewing the intrinsic evidence, it is my opinion that “touch event filter” does not refer to any particular class of known structures or components. It is also my opinion that the term does not identify any physical circuitry, hardware module, or software architecture with known structure. Instead, the term describes a function—namely, filtering or processing touch input to produce something else—without identifying the specific mechanism, hardware, software routine, or algorithm used to perform that function.

123. Although the word “filter” is occasionally used in technical literature, it is not a term that by itself connotes any specific or sufficiently definite structure, particularly in this context. Rather, it is my opinion that a POSITA would understand “filter” to be used as a functional placeholder in the context of the disputed limitation, much like the word “means.” Stated differently, it is my opinion that “filter” in this context is merely a generic, functional term. *See* Ex. 20 (MICROSOFT COMPUTER DICTIONARY (213-14) (5th ed. 2002) (defining “filter” as “A program or set of features within a program that reads its standard or designated input, transforms the input in some desired way, and then writes the output to its standard or designated output destination.”)); Ex. 22 (OXFORD ENGLISH DICTIONARY, <https://doi.org/10.1093/OED/3472255355> (last visited July 22, 2025) (defining “filter” as “A program or software function that processes data, and orders or reformats it according to some preset rule or condition.”)).

124. The term “touch event filter” fails to specify what type of filter is intended. Filters can take many forms — such as high-pass, low-pass, band-pass, or notch filters — each with distinct functions and corresponding structural or algorithmic implementations. Filters may be implemented using mechanical components (e.g., springs and dampers), electrical circuits, or

software code. However, the specification provides no technical details or structural description of any such filter. Without any disclosure of the particular type of filter, how it is arranged, or how it operates on a touch event, a POSITA is left to guess. From a technical standpoint, the term “touch event filter” could refer to any number of different hardware or software implementations capable of performing the filtering function. In my opinion, the term does not denote any particular structure, nor would it convey to a POSITA a class of known structures. The only thing “touch event filter” communicates is the intended result—filtering or selecting certain touch events from a stream of inputs.

125. Even when considering the full phrase “touch event filter,” there is no concrete structure identified. A “filter” in this context could be implemented in many ways: via conditional logic, gesture recognition algorithms, thresholding routines, or heuristic rules. Without further elaboration in the claim or specification, a POSITA would not be able to discern the structure that performs the claimed function.

126. Having determined that “touch event filter” should be construed as means-plus-function, I next examined the specification to determine whether it discloses sufficient corresponding structure that is clearly linked to the function of: “generat[ing] touch input messages that can be recognized as key inputs by the application, based on touch event objects that are generated based on touch signals for regions corresponding to the virtual buttons, which belong to touch signals input via the touch screen.”

127. The specification mentions the “touch event filter” in passing and treats the term so broadly as to generically be anything that performs the recited function. In particular, the specification describes the “touch event filter” in general, functional terms, most of which merely parrots the functional claim language and none of which identify any corresponding structure. The

term “touch event filter” is only mentioned three times in the specification, which describes it as follows:

- “a **touch event filter** configured to generate touch input messages that can be recognized as key inputs by the application, based on touch event objects that are generated based on touch signals for regions corresponding to the virtual buttons, which belong to touch signals input via the touch screen; and.” Ex. 1, ’709 Patent at 2:9-14.
- “For this purpose, the virtual controller client 20 may include a button setting adjusting unit 21, a user virtual button interface 22, a touch event generating unit 23, a **touch event filter 24**, an acceleration data generating unit 25, an acceleration data filter 26, and a client message interfacing unit 27.” *Id.* at 5:62-67.
- “The touch event generating unit 23 generates touch event objects based on valid touch signals related to regions corresponding to the virtual buttons, which belong to input touch signals.” *Id.* at 7:59-8:3.

128. Moreover, Figure 1 (reproduced below), which is intended to illustrate the overall system, simply lists the “touch event filter” as item 24 without any accompanying diagram or structural explanation. In my opinion, such a reference does not clearly link the claimed function to a structure.

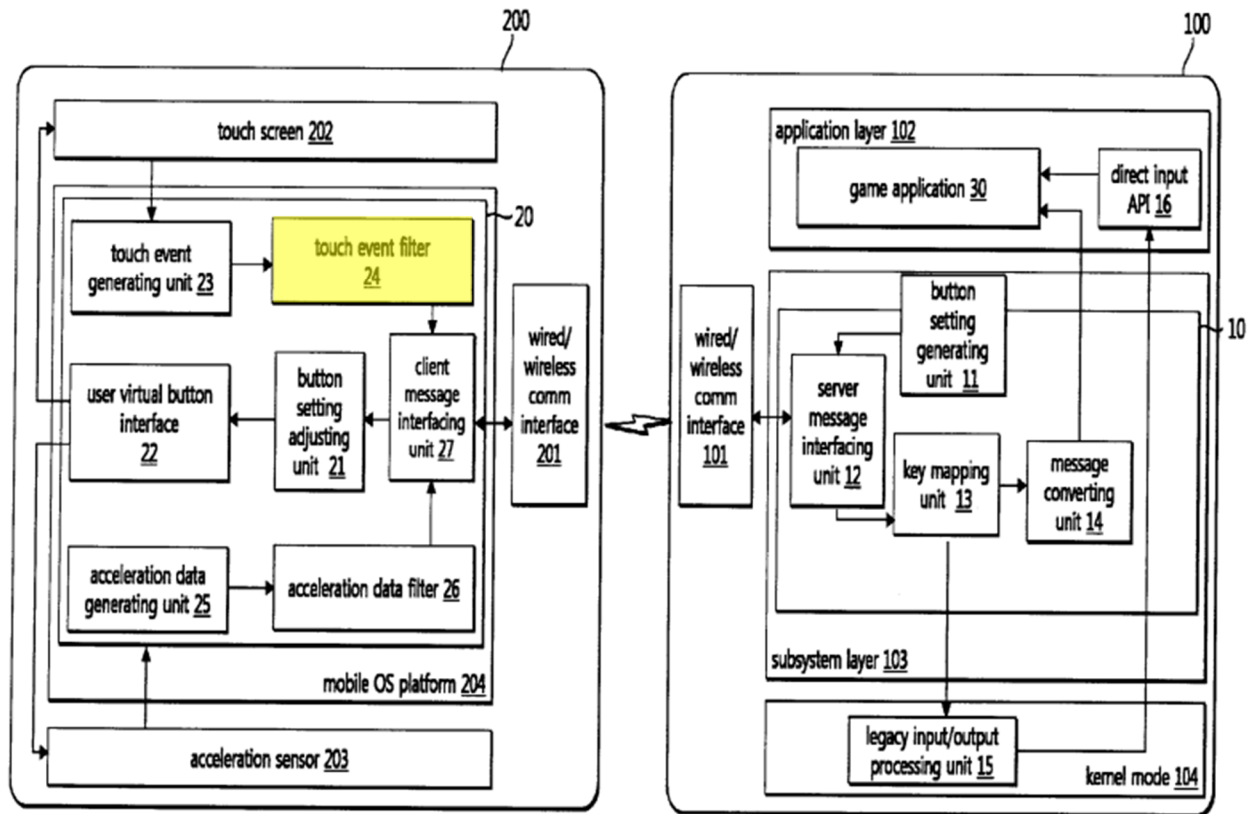


Fig. 1 of the '709 Patent (annotations added).

129. In addition, the specification provides no further detail on what the “touch event filter” is, how it operates, or how it performs the claimed filtering function. There is no algorithm, pseudocode, flowchart, or software routine disclosed for generating “touch input messages recognized as key input by the application.” The “touch event filter” is merely listed as a component in a black-box system without any discussion of its internal logic, structure, or implementation.

130. Therefore, because (1) a POSITA would not understand “touch event filter” to recite sufficiently definite structure or (2) a POSITA would understand “touch event filter” to recite function without reciting sufficient structure for performing the function, I understand that the term “touch event filter” is properly construed as a means-plus-function term.

131. Having determined that the term “touch event filter” is properly construed as a means-plus-function term, it is my opinion, the function of “touch event filter” is “to generate touch input messages recognized as key input by the application, based on touch event objects that are generated from touch signals, of the touch regions corresponding to the virtual buttons, among touch signals input by the touch screen.” This is apparent from the plain language of the claim and the specification as discussed above and expressly incorporated here.

132. As to the structure corresponding to that function, it is my opinion that the specification does not disclose sufficient structure that corresponds to the claimed invention. For the reasons discussed above, which are expressly incorporated here, it is my opinion that there is no structure or algorithm disclosed. Instead, the specification only recites functional language that adds nothing beyond the functional language already present in the claim language.

133. Thus, because there is insufficient structure corresponding to the claimed function, it is my opinion that the “touch event filter” term is indefinite and, thus, the claims reciting the term are invalid.

**E. Term 7: “Client message interfacing unit” (claims 1 and 2)**

| <b>Term</b>                                      | <b>Plaintiff’s Proposed Construction</b> | <b>Defendant’s Proposed Construction</b>                                                                                                                                                                                                                                                                                                                  |
|--------------------------------------------------|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Client message interfacing unit (claims 1 and 1) | Plain and ordinary meaning               | Means plus function<br><br><u>Function:</u><br>“configured to convert the touch input message into a virtual input message in a form recognized by the virtual controller server, and to output, to the virtual controller server the converted touch input message as the virtual input message.”<br><br><u>Structure:</u><br>No corresponding structure |



| Term | Plaintiff's Proposed Construction | Defendant's Proposed Construction                   |
|------|-----------------------------------|-----------------------------------------------------|
|      |                                   | disclosed. Therefore, the limitation is indefinite. |

134. In my opinion, a POSITA would understand the term “client message interfacing unit,” as used in the ’709 Patent, to be a means-plus-function term under 35 U.S.C. § 112, ¶ 6, despite the absence of the word “means.” Because the claim limitation does not recite definite structure that performs the claimed function. It is also my opinion that the specification of the ’709 Patent fails to disclose any structure corresponding to the functions performed by the “client message interfacing unit,” rendering the term indefinite under § 112, ¶ 2.

135. Beginning with the claim language, the term “client message interfacing unit” appears in claims 1 and 2 of the ’709 Patent. Specifically, claim 1 recites:

1. A mobile terminal comprising a virtual controller client configured to remotely communicate with a virtual controller server running on a computer for remote key input to an application running on the computer, the virtual controller client comprising:

a button setting adjusting unit configured to receive first button setting information including a mapping relationship between key inputs to the application and associated virtual input messages, and to specify an arrangement and attributes of virtual buttons based on the received first button setting information;

a user virtual button interface configured to generate a first virtual button screen based on the first button setting information in which touch regions corresponding to the virtual buttons are visually displayed, and to display the first virtual button screen on a touch screen display device of the mobile terminal;

a touch event filter configured to generate touch input messages recognized as key input by the application, based on touch event objects that are generated from touch signals, of the touch regions corresponding to the virtual buttons, among touch signals input by the touch screen; and

a **client message interfacing unit** configured to convert the touch input message into a virtual input message in a form recognized by the virtual controller server, and to output, to the virtual controller server, the converted touch input message as the virtual input message,

wherein the mapping relationship dynamically redefines the virtual input message associated with a given key input of the key inputs based on an event in the application,

wherein the button setting adjusting unit is configured to receive second button setting information including the dynamically changed virtual message associated with the given key input, and

wherein, in response to an occurrence of the event in the application, the user virtual button interface is configured to generate and display, on the touch screen display device of the mobile terminal, a second virtual button screen based on the second button information.

136. Claim 2 depends from claim 1 and similarly recites:

2. The mobile terminal of claim 1, wherein:

The user virtual button interface activates an acceleration sensor of the mobile terminal to enable a detection of movements of the mobile terminal, and the virtual controller client further comprises:

an acceleration data filter configured to generate a movement input message that is mapped to a key input of the application, based on acceleration data that is generated based on acceleration signal generated by the acceleration sensor; and

the **client message interfacing unit** operable to convert the touch input message or the movement input message into a virtual input message in a form recognized by the virtual controller server.

137. Based on this claim language, a POSITA would understand that the “client message interfacing unit” is “configured to convert the touch input message into a virtual input message in a form recognized by the virtual controller server, and to output, to the virtual controller server, the converted touch input message as the virtual input message.” Additionally, the “client message interfacing unit” may, for the purposes of claim 2, “convert the touch input message or movement input message into a virtual input message in a form recognized by the virtual controller server.” In my opinion, this is the function performed by the “client message interfacing unit.”

138. These recitations are purely functional and do not identify any corresponding structure for performing the stated functions. The claim language offers no structural detail about

how the “unit” performs its functions or what physical components or software logic it may contain. In my opinion, this is a textbook case of a black-box recitation of function without structure.

139. I understand that the claim language does not use “means” in connection with “client message interfacing unit” such that there is a rebuttable presumption against construing the term as a means-plus-function term. But it is my opinion that the claim term fails to recite sufficiently definite structure or else recites function without reciting sufficient structure for performing that function. Specifically, after considering the words of the claims and the intrinsic evidence, and based on my experience, it is my opinion that there is no sufficiently definite structure that a POSITA would understand for the “client message interfacing unit” and “client message interfacing unit” does not connote any particular structure or class of structure to a POSITA.

140. In my opinion, a POSITA would recognize that “unit,” as used in “client message interfacing unit,” is a generic, placeholder term—a nonce word that fails to connote any definite structure. The term “unit” could mean almost anything in block diagram parlance. It could imply a physical device with discrete electrical components working with analog circuitry. It could imply a digital device standing alone from the rest of the components or it could simply indicate lines of code. Without a more complete description, the term “unit” and associated “client message interfacing unit” are generic and do not connote any structure to a POSITA.

141. None of the modifiers preceding “unit”—namely, “client message interfacing”—impart any structural meaning to the term. These words merely describe what the unit is supposed to do: interface with client messages. They do not describe how the unit does so, or provide any information about its configuration, architecture, or componentry. In my experience and in the

context of the '709 Patent, “client message interfacing” is purely functional—it refers to the goal or result of the unit’s operation, not to any specific structure.

142. In addition, the specification describes the “client message interfacing unit” so broadly as to generically be anything that performs the recited function. In particular, the specification describes the “touch event filter” in general, functional terms, most of which merely parrots the functional claim language and none of which identify any corresponding structure. The term “client message interfacing unit” is mentioned only as follows in the specification:

- “The **client message interfacing unit 27** converts the touch input message or the movement input message into a virtual input message in a form that can be acknowledged by the virtual controller server 10, and transmits the virtual input message to the personal computer 100 via the wired/wireless communication interface 201.” *Id.* at 8:14-19.
- “The **client message interfacing unit** may operate such that the **client message interfacing unit** converts the touch input message or movement input message into a virtual input message in a form that can be received by the virtual controller server and outputs the virtual input message.” *Id.* at 2:29–33.
- “A **client message interfacing unit** configured to convert the touch input message into a virtual input message in a form that can be received by the virtual controller server, and to output the virtual input message.” *Id.* at 2:15–19.
- “The virtual controller client 20 may include a button setting adjusting unit 21, a user virtual button interface 22, a touch event generating unit 23, a touch event filter 24, an acceleration data generating unit 25, an acceleration data filter 26, and a **client message interfacing unit 27.**” *Id.* at 5:62–67.

143. For example, the specification states that “the client message interfacing unit converts the touch input message or movement input message into a virtual input message in a form that can be received by the virtual controller server” (*id.* at 2:30-33) without providing any structural details explaining how this conversion is performed. There is no disclosure of any algorithms, software logic, circuitry, or data mapping structure that carries out the stated function. Depending on implementation, such a conversion could involve protocol translation, data

reformatting, or interpretation logic—each requiring different structure. The other excerpts shown above suffer from the same problem.

144. The only figure that purports to illustrate the “client message interfacing unit” is Figure 1 (reproduced below), only labels the “client message interfacing unit” in a functional block diagram. Figure 1 provides no detail regarding any structure for the “client message interfacing unit.” The figure conveys no internal components, algorithmic details, architecture, circuitry, code, or hardware layout from which a POSITA could derive structural understanding. The text simply repeats the claimed functions in slightly varied form.

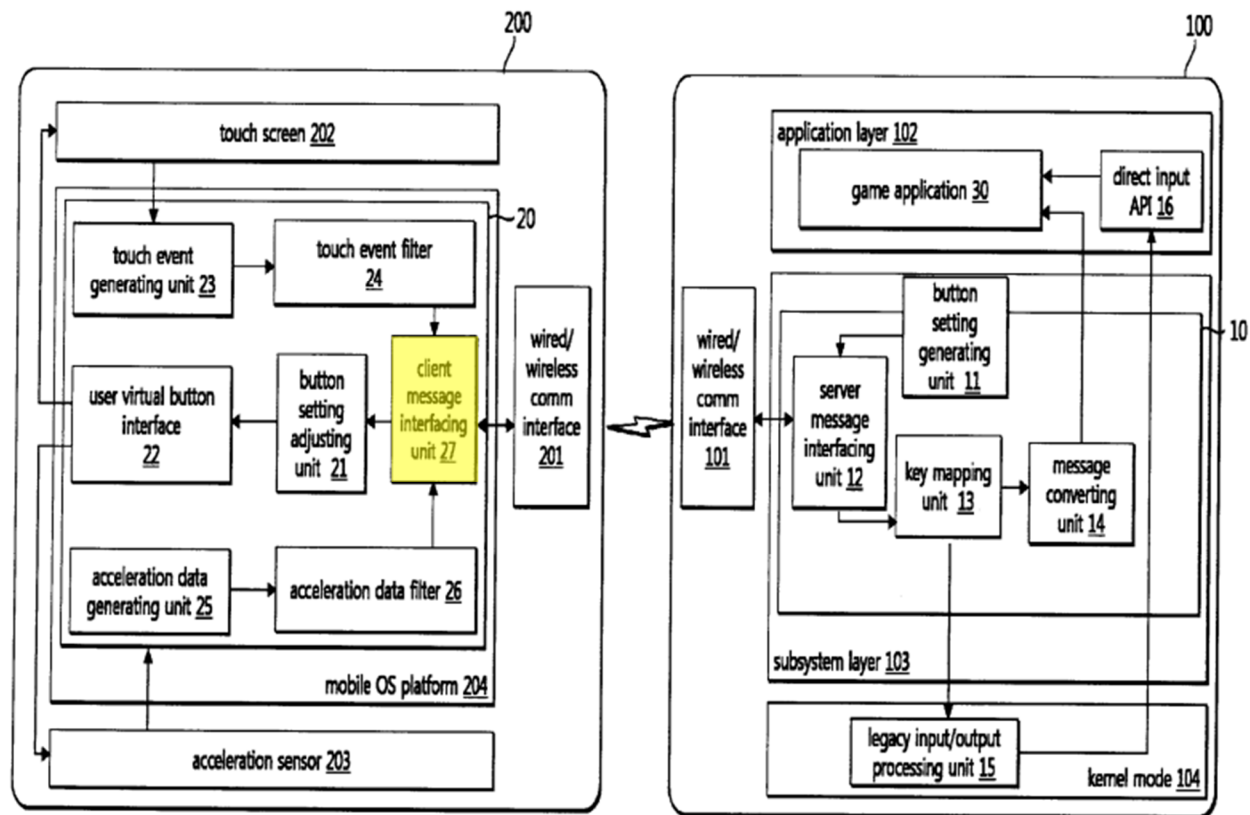


Fig. 1 of the '709 Patent (annotations added).

145. In my opinion, the specification provides no structure for the claimed functions of converting touch or movement input messages into a virtual input message in a form recognized

by the virtual controller server and outputting those messages. The specification merely repeats the functions and provides no guidance on implementation, internal design, or components.

146. Therefore, because (1) a POSITA would not understand “client message interfacing unit” to recite sufficiently definite structure or (2) a POSITA would understand “client message interfacing unit” to recite function without reciting sufficient structure for performing the function, I understand that the term “client message interfacing unit” is properly construed as a means-plus-function term.

147. Having determined that the term “client message interfacing unit” is properly construed as a means-plus-function term, it is my opinion, the function of “client message interfacing unit” is “to convert the touch input message into a virtual input message in a form recognized by the virtual controller server, and to output, to the virtual controller server, the converted touch input message as the virtual input message” and may include “to convert the touch input message or the movement input message into a virtual input message in a form recognized by the virtual controller server.” This is apparent from the plain language of the claim and the specification as discussed above and expressly incorporated here.

148. As to the structure corresponding to that function, it is my opinion that the specification does not disclose sufficient structure that corresponds to the claimed invention. For the reasons discussed above, which are expressly incorporated here, it is my opinion that there is no structure or algorithm disclosed. Instead, the specification only recites functional language that adds nothing beyond the functional language already present in the claim language.

149. Thus, because there is insufficient structure corresponding to the claimed function, it is my opinion that the “client message interfacing unit” term is indefinite and, thus, the claims reciting the term are invalid.

**F. Term 8: “virtual controller server” (claims 1, 2, 4, 8)**

| <b>Term</b>                                   | <b>Plaintiff’s Proposed Construction</b> | <b>Defendant’s Proposed Construction</b>                                                                                                                                                                                                                            |
|-----------------------------------------------|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Virtual controller server (claims 1, 2, 4, 8) | Plain and ordinary meaning               | Means plus function<br><br><u>Function:</u><br>“configured to remotely communicate with a virtual controller client running on a remote mobile terminal”<br><br><u>Structure:</u><br>No corresponding structure disclosed. Therefore, the limitation is indefinite. |

150. In my opinion, “virtual controller server” as claimed in claims 1, 2, 4, and 8 is a means-plus-function term because, from the perspective of a POSITA, the claim limitation does not recite definite structure that performs the claimed function. It is also my opinion that the specification of the ’709 Patent fails to disclose any structure corresponding to the functions performed by the “virtual controller server,” rendering the term indefinite.

151. Beginning with the claim language, the term “virtual controller server” appears in the preambles and bodies of asserted claims 1, 2, 4, and 8 of the ’709 Patent as follows:

1. A mobile terminal comprising a virtual controller client configured to remotely communicate with a **virtual controller server** running on a computer for remote key input to an application running on the computer, the virtual controller client comprising:

a button setting adjusting unit configured to receive first button setting information including a mapping relationship between key inputs to the application and associated virtual input messages, and to specify an arrangement and attributes of virtual buttons based on the received first button setting information;

a user virtual button interface configured to generate a first virtual button screen based on the first button setting information in which touch regions corresponding to the virtual buttons are visually displayed, and to display the first virtual button screen on a touch screen display device of the mobile terminal;

a touch event filter configured to generate touch input messages recognized as key input by the application, based on touch event objects that are generated from touch signals, of the touch regions corresponding to the virtual buttons, among touch signals input by the touch screen; and

a client message interfacing unit configured to convert the touch input message into a virtual input message in a form recognized by the **virtual controller server**, and to output, to the **virtual controller server**, the converted touch input message as the virtual input message,

wherein the mapping relationship dynamically redefines the virtual input message associated with a given key input of the key inputs based on an event in the application,

wherein the button setting adjusting unit is configured to receive second button setting information including the dynamically changed virtual message associated with the given key input, and

wherein, in response to an occurrence of the event in the application, the user virtual button interface is configured to generate and display, on the touch screen display device of the mobile terminal, a second virtual button screen based on the second button information.

2. The mobile terminal of claim 1, wherein:

The user virtual button interface activates an acceleration sensor of the mobile terminal to enable a detection of movements of the mobile terminal, and the virtual controller client further comprises:

an acceleration data filter configured to generate a movement input message that is mapped to a key input of the application, based on acceleration data that is generated based on acceleration signal generated by the acceleration sensor; and

the client message interfacing unit operable to convert the touch input message or the movement input message into a virtual input message in a form recognized by the **virtual controller server**.

4. A computer comprising:

a **virtual controller server** configured to remotely communicate with a virtual controller client running on a remote mobile terminal including a touch screen display device for remote key input on an application running on the computer, the **virtual controller server** comprising:

a button setting generating unit configured to generate and transmit, to the virtual controller client, first button setting information including a mapping relationship between key inputs to the application and associated virtual input messages;



a server message interfacing unit configured to transmit a setting message including the first button setting information to the virtual controller client, and to receive a virtual input message from the virtual controller client, the virtual input message being generated based on a touch on the touch screen display device of the mobile terminal; and

a key mapping unit configured to identify a key input value mapped to the received virtual input message based on the first button setting information,

wherein the mapping relationship dynamically redefines the virtual input message associated with a given key input based on an event in the application,

wherein the button setting generating unit is further configured to, in response to an occurrence of the event in the application, generate and transmit, to the virtual controller client, second button setting information including the dynamically changed virtual input message associated with the given key input, and

wherein the key mapping unit is further configured to identify the key input value mapped to the dynamically changed virtual input message based on the second button setting information.

8. The computer of claim 4, further comprising a computer-readable storable medium storing a program that is run by the **virtual controller server**.

152. Based on this claim language, a POSITA would understand that the “virtual controller server” is “configured to remotely communicate with a virtual controller client running on a remote mobile terminal.” In my opinion, this is the function performed by the “virtual controller server.”

153. I understand that the claim language does not use “means” in connection with “virtual controller server” such that there is a rebuttal presumption against construing the term as a means-plus-function term. But it is my opinion that the claim term fails to recite sufficiently definite structure or else recites function without reciting sufficient structure for performing that function. Specifically, after considering the words of the claims and the intrinsic evidence, and based on my experience, it is my opinion that there is no sufficiently definite structure that a POSITA would understand for the “virtual controller server” and the term “virtual controller server” does not connote any particular structure or class of structure to a POSITA.

154. In my opinion, a POSITA would not understand “virtual controller server” to connote structure because the term is not a term of art and has no established structural meaning. Based on my education and experience, and after reviewing the intrinsic evidence, it is my opinion that “virtual controller server” does not refer to any particular class of known structures or components. It is also my opinion that the term does not identify any physical circuitry, hardware module, or software architecture with known structure. Rather, “server” in the context of computing and network is a generic, functional term typically used to denote an environment in which software might run. *See* Ex. 20 (MICROSOFT COMPUTER DICTIONARY (474) (5th ed. 2002) (defining “server” as “1. On a local area network (LAN), a computer running administrative software that controls access to the network and its resources, such as printers and disk drives, and provides resources to computers functioning as workstations on the network. 2. On the Internet or other network, a computer or program that responds to commands from a client. For example, a file server may contain an archive of data or program files; when a client submits a request for a file, the server transfers a copy of the file to the client.”)); Ex. 23 (OXFORD ENGLISH DICTIONARY, <https://doi.org/10.1093/OED/2299470617> (last visited July 22, 2025) (defining “server” as “a program designed to provide other programs with access to a resource, service, etc., over a computer network. In later use also: a computer used to provide other computers with access to a resource, service, etc., over a computer network.”)).

155. Compounding the confusion is uncertainty as to how the “button setting generating unit 11” actually interfaces with the virtual controller server actually functions. From Figure 1 it can be seen that part of the button setting generating unit lies within the virtual controller; however, the same mechanism crosses a functional boundary, lies outside of the virtual controller, but within the subsystem layer 103. A POSITA would have to ask how does this function occur? Does the

button setting generating unit control the rest of the components within the subsystem layer? Is there a finite communication mechanism within the button setting generating unit that crosses the functional boundary? Given that the button setting generating unit is an upstream terminal block does this indicate that the aggregate functionality of the subsystem layer is the primary input for the button setting generating unit, or is it a small component within the virtual controller server that is simply misplaced. Clearly the confusion generated by functional boundary breach indicated in Figure 1 results in a high level of functional ambiguity, making it impossible for a POSITA to understand just how it works, where it fits within the system and what it does.

156. The similarity in terms of the “button setting generating unit” 11 and the “button setting adjusting unit” 21 also muddies the water. Both terms indicate similar means and functions; however, the button setting adjusting unit is a midstream component in the virtual controller client, while the button setting generating unit is an upstream terminal component in the virtual controller server and the subsystem layer simultaneously. How these similarly worded items have such different places in two paired systems is not explained.

157. The use of “virtual controller” as a modifier does not alter this analysis. “Virtual” denotes that the functionality is software-based or emulated rather than physical, and “controller” is also a generic term commonly used to refer to a device or program that performs control-related functions. Taken together, “virtual controller server” is merely a functional label for software that interacts with a client to facilitate some type of user control or input. It provides no meaningful structural limitation and is simply a black-box reference to unspecified functionality.

158. In addition, the specification treats the term so broadly as to generically be anything that performs the recited function. In particular, the specification describes the “virtual controller server” in general, functional terms, most of which merely parrots the functional claim language

and none of which identify any corresponding structure. For instance, the specification provides repeated functional descriptions of the “virtual controller server”:

- “According to an aspect of the present invention, there is provided a virtual controller client, the virtual controller client operating based on a mobile terminal so that the virtual controller client can remotely communicate with a **virtual controller server** running on a computer for remote key input on an application running on the computer, the virtual controller client including: a button setting adjusting unit configured to receive button setting information including mapping relationship between key inputs to the application and virtual input messages from the **virtual controller server**, and to specify an arrangement and attributes of virtual buttons based on the received button setting information; ...” Ex. 1, ’709 Patent at 1:58-2:3.
- “a client message interfacing unit configured to convert the touch input message into a virtual input message in a form that can be received by the **virtual controller server**, and to output the virtual input message.” *Id.* at 2:15-19.
- “the client message interfacing unit may operate Such that the client message interfacing unit converts the touch input message or movement input message into a virtual input message in a form that can be received by the **virtual controller server** and outputs the virtual input message. According to another aspect of the present invention, there is provided a **virtual controller server**, the **virtual controller server** operating on a computer so that the **virtual controller server** can remotely communicate with a virtual controller client running on a remote mobile terminal including a touch screen for remoter key input on an application running on the computer, the **virtual controller server** including: a button setting generating unit configured to generate button setting information including mapping relationship between key inputs to the application and virtual input messages; a server message interfacing unit configured to transmit a setting message including the button setting information to the virtual controller client, and to receive a virtual input message generated based on a touch on the touch screen from the virtual controller client; and a key mapping unit configured to identify a key input value mapped to the received virtual input message based on the button setting information.” *Id.* at 2:29-53.
- “the remote controller interfacing method including: ... generating, by the **virtual controller server**, button setting information including mapping relationship between key inputs required by the application and virtual input messages to be transmitted by the virtual controller client, and transferring, by the **virtual controller server**, the button setting information to the virtual controller client;” *Id.* at 3:46-51.
- “the remote controller interfacing method including: ... identifying, by the **virtual controller server**, a key input value mapped to the received virtual input message

based on the button setting information; and transferring, by the **virtual controller server**, the identified key input value to the application.” *Id.* at 3:63-67.

- “the remote controller interfacing method may further include: ... converting, by the virtual controller client, the movement input message into a virtual input message in a form that can be received by the **virtual controller server**, and outputting, by the virtual controller client, the virtual input message. The key input value identified by the **virtual controller server** may be transferred to the application via the message transfer architecture of an operating system that runs the application on the computer. The key input value identified by the **virtual controller server** may be transferred to the application via the input and output API of an operating system that runs the application on the computer.” *Id.* at 4:10-22.
- “FIG. 1 is a conceptual diagram illustrating a virtual controller client implemented in a mobile terminal and a **virtual controller server** implemented in a personal computer according to an embodiment of the present invention.” *Id.* at 4:30-33.
- “FIG. 3 is a flowchart illustrating a remote controller interfacing method using a virtual controller client implemented on a mobile terminal and a **virtual controller server** implemented on a personal computer according to an embodiment of the present invention.” *Id.* at 4:38-42.
- “FIG. 1 is a conceptual diagram illustrating a virtual controller client 20 implemented in a mobile terminal 200 and a **virtual controller server** 10 implemented in a personal computer 100 according to an embodiment of the present invention. Referring to FIG. 1, the **virtual controller server** 10 is executed as a background task in the personal computer 100, on which a game application 30 to be controlled is running, and the virtual controller client 20 is executed as a foreground task in the mobile terminal 200. The personal computer 100 may be schematically viewed as including a wired/wireless communication interface 101, an application layer 102, a subsystem layer 103, and a kernel mode 104. In this case, the game application 30 and the **virtual controller server** 10 may be viewed as running in the application layer 102 and the subsystem layer 103, respectively.” *Id.* at 4:58-5:7.
- “The **virtual controller server** 10 generates button setting information including mapping relationship between key inputs, required by the game application 30, for example, directional key inputs related to the movement of a game character, direction key inputs related to the gaze direction of a game character, operation key inputs related to the actions of a game character, and function key inputs related to the playing of a game, and virtual input messages to be transmitted from the virtual controller client 20. It also transfers a setting message encapsulating the button setting information to the virtual controller client 20 of the mobile terminal 200, extracts a key input intended by a gamer from a virtual input message received from the virtual controller client 20, and provides information about the key input to the game application 30. For these purposes, the **virtual controller server** 10 may

include a button setting generating unit 11, a server message interfacing unit 12, a key mapping unit 13, and a message converting unit 14. The **virtual controller server** 10 may use a legacy input/output processing unit 15 for the input and output of a keyboard and a mouse in the kernel mode 104, and a Direct Input application programming interface (API) 16 in the application layer 102.” *Id.* at 5:14-37.

- “In an embodiment, more than one single virtual controller client 20 may be connected to a single **virtual controller server** 10. In this case, the **virtual controller server** 10 may bind virtual input messages input from a plurality of virtual controller clients 20 and then provide the virtual input messages to the application 30.” *Id.* at 6:1-6.
- “The operations of the **virtual controller server** 10 and the virtual controller client 20 will be sequentially described below. First, a gamer runs the **virtual controller server** 10 and the application 30 on the personal computer 100, then runs the virtual controller client 20 on the mobile terminal 200, and manipulates the personal computer 100 and the mobile terminal 200 to recognize each other on a single wired/wireless network via the wired/wireless communication interfaces 101 and 201.” *Id.* at 6:13-22.
- “In order to enable the mobile terminal 200 to display a virtual button screen optimized for the performance of a game of the game application 30, the button setting generating unit of the **virtual controller server** 10 generates button setting information including mapping relationship between key inputs required by the application 30 and virtual input messages to be transmitted by the virtual controller client 20. The button setting information is information indicating which key input should be mapped to a specific virtual input message when the virtual controller client 20 returns the specific virtual input message to the **virtual controller server** 10.” *Id.* at 6:29-40.
- “Those cases may require different game interfaces. In these cases, the **virtual controller server** 10 may dynamically change the button setting information in accordance with a game environment and apply on-the-fly the changed button setting information to the virtual controller client 20.” *Id.* at 6:65-7:2.
- “The button setting adjusting unit 21 may generate the virtual button setting information by specifying the arrangement and attributes of virtual buttons that will generate virtual input messages that should be provided to the **virtual controller server** 10 by the virtual controller client based on the button setting information.” *Id.* at 7:11-16.
- “The client message interfacing unit 27 converts the touch input message or the movement input message into a virtual input message in a form that can be acknowledged by the **virtual controller server** 10, and transmits the virtual input message to the personal computer 100 via the wired/wireless communication interface 201.” *Id.* at 8:14-19.

- “FIG. 3 is a flowchart illustrating a remote controller interfacing method using a virtual controller client implemented on a mobile terminal and a **virtual controller server** implemented on a personal computer according to an embodiment of the present invention. Referring to FIG. 3, first, it is assumed that the **virtual controller server** 10 and the application 30 are run on the personal computer 100, the virtual controller client 20 is run on the mobile terminal 200 having the touch screen 202 and the acceleration sensor 203, and the personal computer 100 and the mobile terminal 200 are connected to each other via the wired/wireless communication interfaces 101 and 201. At step S31, the **virtual controller server** 10 generates button setting information including mapping relationship between key inputs required by the application 30 and virtual input messages to be transmitted from the virtual controller client 20, and transfers a setting message including the button setting information to the virtual controller client 20 of the mobile terminal 200.” *Id.* at 8:65-9:16.
- At step S35, the virtual controller client 20 converts the touch input message or movement input message into a virtual input message in a form that can be transmitted to the **virtual controller server** 10, and transmits the virtual input message to the personal computer 100 via the wired/wireless communication interface 201. At step S36, the **virtual controller server** 10 identifies a key input value mapped to the virtual input message received from the virtual controller client 20 based on the button setting information. At step S37, the **virtual controller server** 10 transfers the identified key input value to the application 30 via a Windows message architecture or a direct input API, in the same way as the key input of a legacy controller. Such as a keyboard or a mouse.” *Id.* at 9:33-47.

159. The specification goes on to describe various functional blocks that may be included in the “virtual controller server,” but do not connote any structure either. Such functional blocks include:

- “button setting generating unit,”
- “server message interfacing unit,”
- “key mapping unit,” and
- “message converting unit.”

*Id.* at 5:30-32.

160. In my opinion, these blocks are themselves lacking any structure for implementing their functions. As just one example, and as discussed further in Section VIII(H) below, a “button setting generating unit” is also known only by its function without any corresponding structure.



Thus, listing these functional blocks that may be included in the “virtual controller server” do not constitute corresponding structure.

161. The only figure that purports to illustrate the “virtual controller server” is Figure 1 (reproduced below), which shows the server 10 as an unlabeled box running on a personal computer 100. Figure 1 provides no detail regarding any structure for the “virtual controller server.” Other figures, such as Figure 3 (reproduced below), likewise merely illustrate the sequence of functions performed by the “virtual controller server” without disclosing any structure to perform those functions.

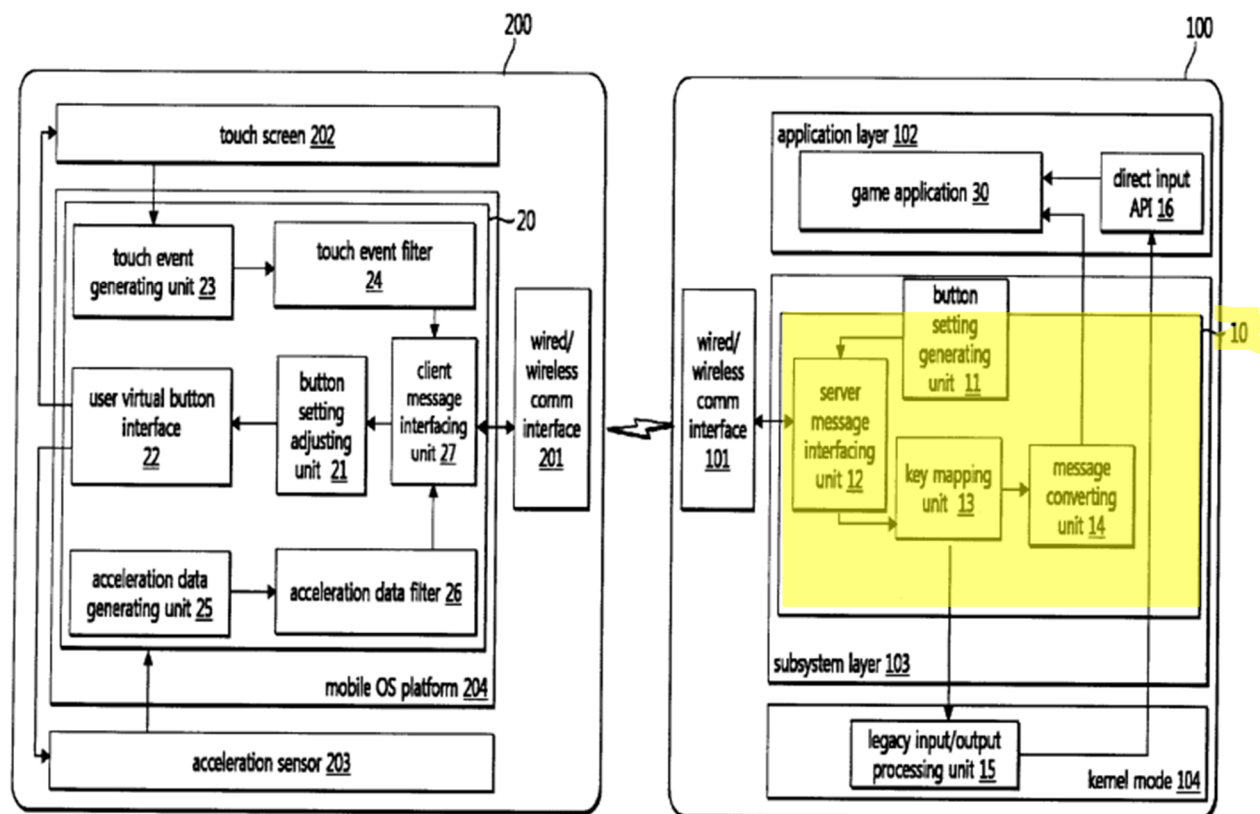


Fig. 1 of the '709 Patent (annotations added).



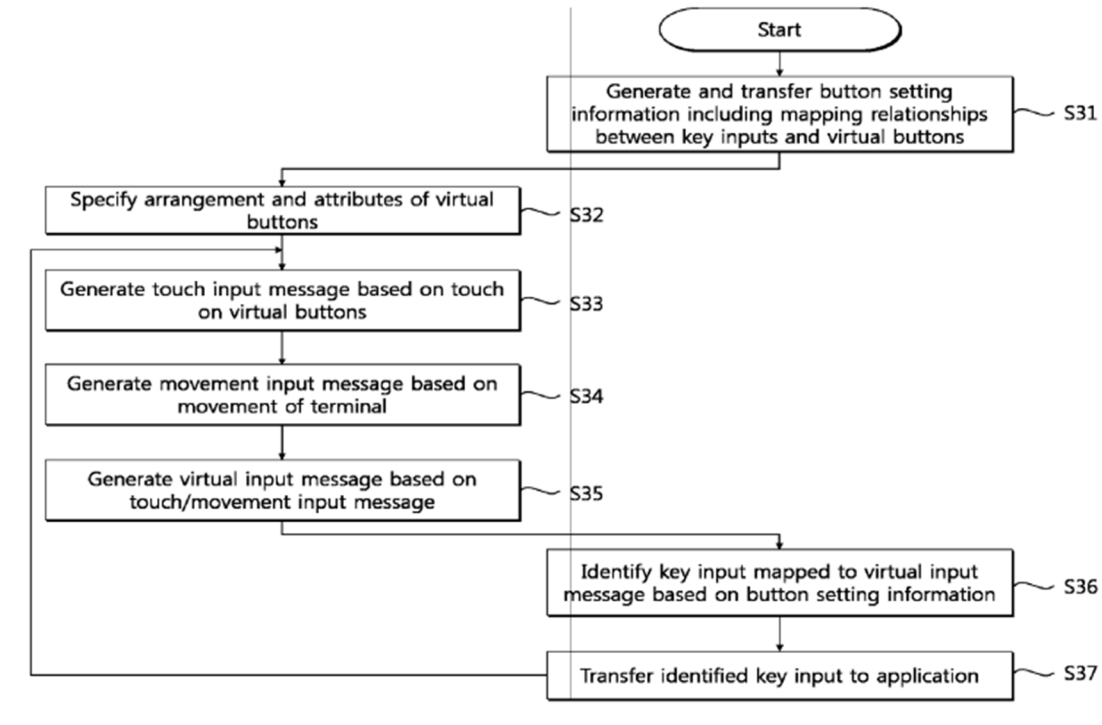


Fig. 3 of the '709 Patent.

162. What is more, the “button setting generating unit” subcomponent of the “virtual controller server” crosses functional boundaries in the system architecture. Part of the unit is shown within the “virtual controller server” functional block diagram, while the other part lies outside, within the subsystem layer 103. By crossing a functional boundary with no external interface indicated (as seen between the wired/wireless comm interface 101 and the server message interfacing unit 12), the level of communication between the “virtual controller server” 10 and the subsystem layer 103 is functionally undefined, leading a POSITA to simply guess as to how such a device would be implemented or integrated.

163. Additionally, Figure 1 contains a critical problem where the two inputs that arrive at the game application 30. One input comes from the message converting unit 14, the other comes from the direct input API 16. Are these inputs additive, multiplicative, or subtractive? It is woefully unclear how these two inputs combine to drive the game application 30.

164. The description of how the game application is given data is also completely unclear: “For these purposes, the virtual controller server 10 may include a button setting generating unit 11, a server message interfacing unit 12, a key mapping unit 13, and a message converting unit 14. The virtual controller server 10 may use a legacy input/output processing unit 15 for the input and output of a keyboard and a mouse in the kernel mode 104, and a Direct Input application programming interface (API) 16 in the application layer 102.” *Id.* 5:37. The above direction contains no information about data flow from any of the components to the game application 30. This is directly at odds with the data flow shown in Figure 1 which shows explicitly that data come from the message converting unit 14, and the direct input API 16. Again, with an unknown mixing of signals as described above. The difference between the verbiage in the specification and the data flow of Figure 1 confuses further, rendering the entire configuration of the device unintelligible.

165. Therefore, because (1) a POSITA would not understand “virtual controller server” to recite sufficiently definite structure or (2) a POSITA would understand “virtual controller server” to recite function without reciting sufficient structure for performing the function, I understand that the term “virtual controller server” is properly construed as a means-plus-function term.

166. Having determined that the term “virtual controller server” is properly construed as a means-plus-function term, it is my opinion, the function of “virtual controller server” is “to remotely communicate with a virtual controller client running on a remote mobile terminal.” This is apparent from the plain language of the claim and the specification as discussed above and expressly incorporated here.

167. As to the structure corresponding to that function, it is my opinion that the specification does not disclose sufficient structure that corresponds to the claimed invention. For the reasons discussed above, which are expressly incorporated here, it is my opinion that there is no structure or algorithm disclosed. Instead, the specification only recites functional language that adds nothing beyond the functional language already present in the claim language.

168. Thus, because there is insufficient structure corresponding to the claimed function, it is my opinion that the “virtual controller server” term is indefinite and, thus, the claims reciting the term are invalid.

**G. Term 9: “Acceleration data filter” (claim 2)**

| <b>Term</b>                        | <b>Plaintiff’s Proposed Construction</b> | <b>Defendant’s Proposed Construction</b>                                                                                                                                                                                                                                                                                                                                                    |
|------------------------------------|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Acceleration data filter (claim 2) | Plain and ordinary meaning               | <p>Means plus function</p> <p><u>Function:</u><br/> “configured to generate a movement input message that is mapped to a key input of the application, based on acceleration data that is generated based on an acceleration signal generated by the acceleration sensor.”</p> <p><u>Structure:</u><br/> No corresponding structure disclosed. Therefore, the limitation is indefinite.</p> |

169. In my opinion, “acceleration data filter” as claimed in claim 2 is a mean-plus-function term because, from the perspective of a POSITA, the claim limitation does not recite definite structure that performs the claimed function. It is also my opinion that the specification of the ’709 Patent fails to disclose any structure corresponding to the functions performed by the “acceleration data filter,” rendering the term indefinite under 35 U.S.C. § 112, ¶ 2.

170. Beginning with the claim language, the term “acceleration data filter” appears in claim 2 of the ’709 Patent, which recites in relevant part:

2. The mobile terminal of claim 1, wherein:

The user virtual button interface activates an acceleration sensor of the mobile terminal to enable a detection of movements of the mobile terminal, and the virtual controller client further comprises:

an **acceleration data filter** configured to generate a movement input message that is mapped to a key input of the application, based on acceleration data that is generated based on acceleration signal generated by the acceleration sensor; and

the client message interfacing unit operable to convert the touch input message or the movement input message into a virtual input message in a form recognized by the virtual controller server.

171. Based on this claim language, a POSITA would understand that the “acceleration data filter” is “configured to generate a movement input message that is mapped to a key input of the application, based on acceleration data that is generated based on an acceleration signal generated by the acceleration sensor.” In my opinion, this is the function performed by the “acceleration data filter.”

172. I understand that the claim language does not use “means” in connection with “acceleration data filter” such that there is a rebuttable presumption against construing the term as a means-plus-function term. But it is my opinion that the claim term fails to recite sufficiently definite structure or else recites function without reciting sufficient structure for performing that function. Specifically, after considering the words of the claims and the intrinsic evidence, and based on my experience, it is my opinion that there is no sufficiently definite structure that a POSITA would understand for the “acceleration data filter” and “acceleration data filter” does not connote any particular structure or class of structure to a POSITA.

173. In my opinion, a POSITA would not understand “acceleration data filter” to connote structure because the term is not a term of art and has no established structural meaning. Based on my education and experience, and after reviewing the intrinsic evidence, it is my opinion that “acceleration data filter” does not refer to any particular class of known structures or components. It is also my opinion that the term does not identify any physical circuitry, hardware module, or software architecture with known structure. Instead, the term describes a function—namely, filtering or processing acceleration data to produce something else—without identifying the specific mechanism, hardware, software routine, or algorithm used to perform that function. Because accelerations come in several different forms, it is unclear what kind of acceleration is being sensed, and more so, what kind(s) is(are) being filtered. Most technologists imply linear accelerations when speaking of generic accelerations. If one moves a device from left to right, or forward and back, linear accelerations are involved; however, rotational accelerations may similarly and simultaneously be involved. These rotational accelerations occur naturally as wrists and arms flex, leading to a high level of spatial coupling between linear accelerations. The algorithms required to decouple linear from rotational are highly involved, are described in weighty texts and require nontrivial coordinate transformations. If rotations are under 90 degrees, typically Eulerian relationships can be called upon, meaning that simple trigonometry and multivector coordinate transformations may be used. If rotations beyond 90 degrees are experienced, then typically quaternion transformations are necessary. These kinds of sensing methods and data handling methods are akin to what is used by satellites, and require a high level of spatial cognizance. It is also unclear whether the “acceleration data filter” is a differentiating filter or integrating filter, and by how many stages. If accelerations are integrated once, then rates can be discerned. If twice, then positions can be determined. Each of these implementations

would require distinct algorithms or hardware structures, but the specification provides no code, algorithm, flowchart, or architectural detail showing how any such function is achieved.

174. Moreover, the term “filter” is not a term that connotes definite structure to a POSITA in this context. Based on my education, training, and experience in this field, I understand “filter” to be a generic, nonce term that refers to an abstract function or process, not a particular hardware or software structure—particularly in the context of digital processing or input signal conversion. *See* Ex. 20 (MICROSOFT COMPUTER DICTIONARY (213-14) (5th ed. 2002) (defining “filter” as “A program or set of features within a program that reads its standard or designated input, transforms the input in some desired way, and then writes the output to its standard or designated output destination.”)); Ex. 22 (OXFORD ENGLISH DICTIONARY, <https://doi.org/10.1093/OED/3472255355> (last visited July 22, 2025) (defining “filter” as “A program or software function that processes data, and orders or reformats it according to some preset rule or condition.”)).

175. The term “acceleration data filter” fails to specify what type of filter is intended. Filters can take many forms — such as high-pass, low-pass, band-pass, or notch filters — each with distinct functions and corresponding structural or algorithmic implementations. Filters may be implemented using mechanical components (e.g., springs and dampers), electrical circuits, or software code. However, the specification provides no technical details or structural description of any such filter. Without any disclosure of the particular type of filter, how it is arranged, or how it operates on a touch event, a POSITA is left to guess. The word “filter” merely describes the result of processing or rejecting data—it does not denote how this is achieved, or by what specific structural means. In terms of device controls, the term “filter” can mean many things from mechanical to physical, low-pass, band-pass, notch-pass, and many others. Each one has a specific

meaning, structure and design. In this context, the “acceleration data filter” simply performs the function of transforming acceleration data into a movement input message. There is no indication in the claim language of any circuitry, code, algorithm, or specific processing module that accomplishes this task.

176. As such, in my opinion, a POSITA would understand “acceleration data filter” to be a means-plus-function limitation because: (1) it describes only what the element does (i.e., its function); (2) it lacks recitation of any specific structure capable of performing that function; and (3) the word “filter” is used as a functional placeholder rather than a structural term.

177. The specification mentions the “acceleration data filter” in passing and treats the word “filter” so broadly as to generically be anything that performs the recited function. In particular, the specification describes the “acceleration data filter” in general, functional terms, most of which merely parrots the functional claim language and none of which identify any corresponding structure. The term “acceleration data filter” is only mentioned three times in the ’709 Patent specification, which describes it as follows:

- “For this purpose, the virtual controller client 20 may include a button setting adjusting unit 21, a user virtual button interface 22, a touch event generating unit 23, a touch event filter 24, an acceleration data generating unit 25, an **acceleration data filter** 26, and a client message interfacing unit 27.” Ex. 1, ’709 Patent at 5:62–67.
- “Furthermore, when a gamer tilts or moves the mobile terminal 200, the acceleration sensor 203 generates an acceleration signal. The generated acceleration signal is input to the acceleration data generating unit 25 and processed so as to be valid acceleration data. The **acceleration data filter** 26 may generate a movement input message that can be finally recognized as a key input by the game application 30 based on the valid acceleration data.” *Id.* at 8:4–12.  
“At step S34, the virtual controller client 20 generates acceleration data based on an acceleration signal that is generated by the acceleration sensor 203 when a gamer tilts or moves the mobile terminal 200, and generates a movement input message based on the valid acceleration data.” *Id.* at 9:28–32.

178. These disclosures merely repeat the same function set forth in the claim: generating a movement input message based on processed acceleration data. The specification does not disclose any algorithm, module, or software logic for how the filter generates the movement input message. Nor does it provide any diagram, code, or flowchart that illustrates the internal workings of the “acceleration data filter.”

179. In addition, the only associated figure, Figure 1 (reproduced below), merely shows “acceleration data filter 26” as a labeled block in a high-level architecture diagram without any accompanying diagram or structural explanation. In my opinion, such reference does not clearly link the claimed function to a structure.

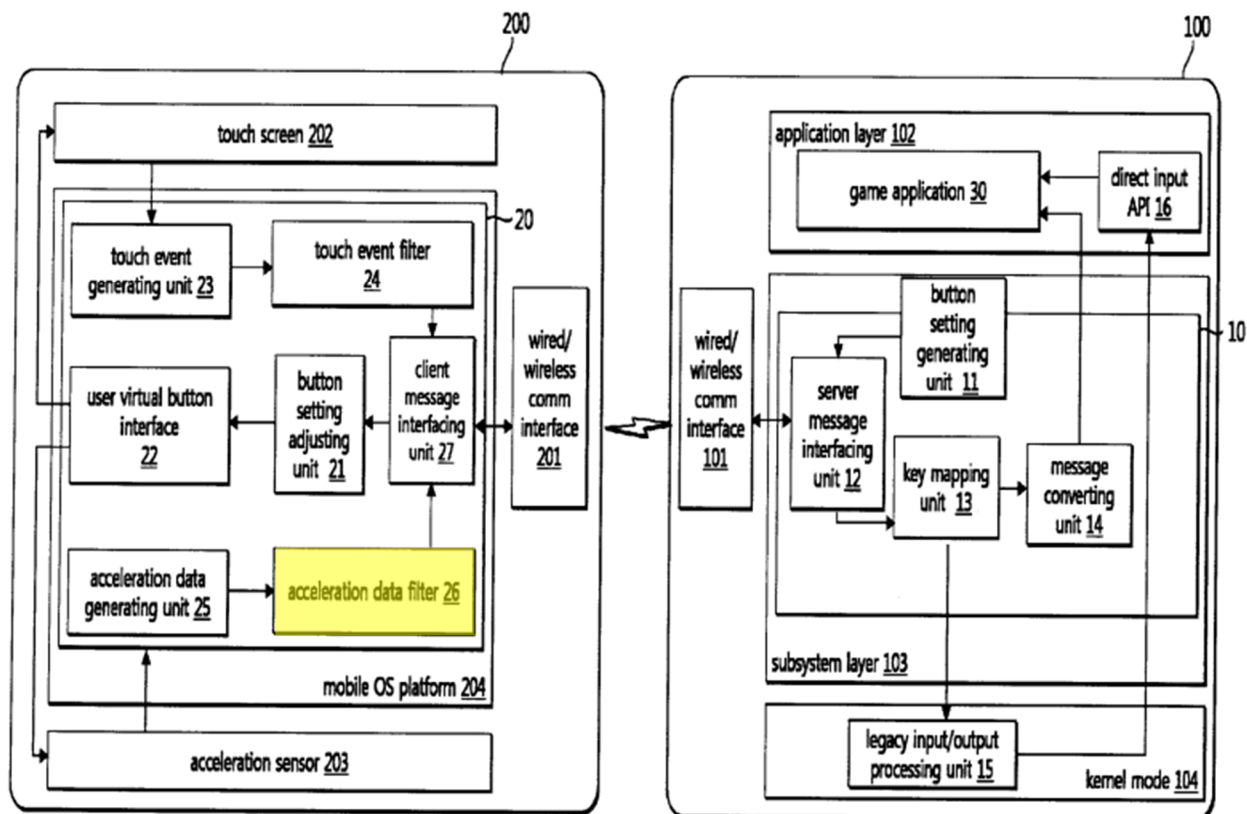


Fig. 1 of the '709 Patent (annotations added).

180. In addition, the specification provides no further detail on what the “acceleration data filter” is, how it operates, or how it performs the claimed filtering function. There is no



algorithm, pseudocode, flowchart, or software routine disclosed for generating “movement input message that is mapped to a key input of the application, based on acceleration data that is generated based on an acceleration signal generated by the acceleration sensor.” In my opinion, this level of disclosure fails to provide a POSITA with any structure for the “acceleration data filter.” It is purely black-box, with no explanation of how the function is achieved.

181. Here, the claimed function requires the “filter” to perform multiple layered operations: transforming sensor data into key input commands. This is not the type of simple low-pass or high-pass filtering one might associate with traditional signal filters, and the patent provides no clue that any such known filter structure applies here. A POSITA would understand that this is an entirely application-specific function and would look to the specification to understand how the filter achieves it. But the specification provides nothing beyond the black-box reference to “acceleration data filter 26.”

182. Therefore, because (1) a POSITA would not understand “acceleration data filter” to recite sufficiently definite structure or (2) a POSITA would understand “acceleration data filter” to recite function without reciting sufficient structure for performing the function, I understand that the term “acceleration data filter” is properly construed as a means-plus-function term.

183. Having determined that the term “acceleration data filter” is properly construed as a means-plus-function term, it is my opinion, the function of “acceleration data filter” is “to generate a movement input message that is mapped to a key input of the application, based on acceleration data that is generated based on an acceleration signal generated by the acceleration sensor.” This is apparent from the plain language of the claim and the specification as discussed above and expressly incorporated here.

184. As to the structure corresponding to that function, it is my opinion that the specification does not disclose sufficient structure that corresponds to the claimed invention. For the reasons discussed above, which are expressly incorporated here, it is my opinion that there is no structure or algorithm disclosed. Instead, the specification only recites functional language that adds nothing beyond the functional language already present in the claim language.

185. Thus, because there is insufficient structure corresponding to the claimed function, it is my opinion that the “acceleration data filter” term is indefinite and, thus, the claims reciting the term are invalid.

#### **H. Term 10: “Button setting generating unit” (claim 4)**

| <b>Term</b>                              | <b>Plaintiff’s Proposed Construction</b> | <b>Defendant’s Proposed Construction</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|------------------------------------------|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Button setting generating unit (claim 4) | Plain and ordinary meaning               | <p>Means plus function</p> <p><u>Function:</u><br/> “configured to generate and transmit, to the virtual controller client, first button setting information including a mapping relationship between key inputs to the application and associated virtual input messages ...[and] is further configured to, in response to an occurrence of the event in the application, generate and transmit, to the virtual controller client, second button setting information including the dynamically changed virtual input message associated with the given key input.”</p> <p><u>Structure:</u><br/> No corresponding structure disclosed. Therefore, the limitation is indefinite.</p> |

186. In my opinion, “button setting generating unit” as claimed in claim 4 is a means-plus-function term because, from the perspective of a POSITA, the claim limitation does not recite definite structure that performs the claimed function. It is also my opinion that the specification of the ’709 Patent fails to disclose any structure corresponding to the functions performed by the “button setting generating unit,” rendering the term indefinite under 35 U.S.C. § 112, ¶ 2.

187. Beginning with the claim language, the term “button setting generating unit” appears in independent claim 4, which recites:

4. A computer comprising:

a virtual controller server configured to remotely communicate with a virtual controller client running on a remote mobile terminal including a touch screen display device for remote key input on an application running on the computer, the virtual controller server comprising:

a **button setting generating unit** configured to generate and transmit, to the virtual controller client, first button setting information including a mapping relationship between key inputs to the application and associated virtual input messages;

a server message interfacing unit configured to transmit a setting message including the first button setting information to the virtual controller client, and to receive a virtual input message from the virtual controller client, the virtual input message being generated based on a touch on the touch screen display device of the mobile terminal; and

a key mapping unit configured to identify a key input value mapped to the received virtual input message based on the first button setting information,

wherein the mapping relationship dynamically redefines the virtual input message associated with a given key input based on an event in the application,

wherein **the button setting generating unit** is further configured to, in response to an occurrence of the event in the application, generate and transmit, to the virtual controller client, second button setting information including the dynamically changed virtual input message associated with the given key input, and

wherein the key mapping unit is further configured to identify the key input value mapped to the dynamically changed virtual input message based on the second button setting information.

188. Based on this claim language, a POSITA would understand that the “button setting generating unit” is (1) “configured to generate and transmit, to the virtual controller client, first button setting information including a mapping relationship between key inputs to the application and associated virtual input messages” and (2) “is further configured to, in response to an occurrence of the event in the application, generate and transmit, to the virtual controller client second button setting information including the dynamically changed virtual input message associated with the given key input. In my opinion, these are the functions performed by the “button setting generating unit.”

189. I understand that the claim language does not use “means” in connection with “button setting generating unit” such that there is a rebuttable presumption against construing the term as a means-plus-function term. But it is my opinion that the claim term fails to recite sufficiently definite structure or else recites function without reciting sufficient structure for performing that function. Specifically, after considering the words of the claims and the intrinsic evidence, and based on my experience, it is my opinion that there is no sufficiently definite structure that a POSITA would understand for the “button setting generating unit” and “button setting generating unit” does not connote any particular structure or class of structure to a POSITA.

190. In my opinion, a POSITA would not understand “button setting generating unit” to connote structure because the term is not a term of art and has no established structural meaning. Based on my education and experience, and after reviewing the intrinsic evidence, it is my opinion that “button setting generating unit” does not refer to any particular class of known structures or components. It is also my opinion that the term does not identify any physical circuitry, hardware module, or software architecture with known structure. Instead, the term contains a generic word “unit” described only by the function it performs. There is no structural context in the claim

language that would inform a POSITA of any particular class of structures or hardware to perform the function. The modifiers “button setting” and “generating” are likewise functional—they describe what the unit does, not what it is. Thus, in my opinion, the phrase “button setting generating unit” is functionally defined and lacks structural connotation.

191. I have reviewed the ’709 Patent specification in detail. In my opinion, the specification does not disclose any structure—whether hardware, software, algorithm, or otherwise—that a POSITA would recognize as being clearly linked to the functions recited in the claim.

192. In addition, the specification treats the term so broadly as to generically be anything that performs the recited function. In particular, the specification describes the “button setting generating unit” in general, functional terms, most of which merely parrots the functional claim language and none of which identify any corresponding structure. For example, the specification only describes the “button setting generating unit” as follows:

- “a **button setting generating unit** configured to generate button setting information including mapping relationship between key inputs to the application and virtual input messages.” *Id.* at 2:42-45.
- “The virtual controller server 10 may include a **button setting generating unit 11** ...” *Id.* at 5:30-31.
- “In order to enable the mobile terminal 200 to display a virtual button screen optimized for the performance of a game ... the **button setting generating unit** of the virtual controller server 10 generates button setting information including mapping relationship between key inputs required by the application 30 and virtual input messages to be transmitted by the virtual controller client 20.” *Id.* at 6:29-35.
- “The **button setting generating unit 11** transfers the button setting information to the server message interfacing unit 12, ...” *Id.* at 7:3-5.
- “The key mapping unit 13 may identify the key input value mapped to the virtual input message received from the virtual controller client 20 based on the button

setting information previously set by the **button setting generating unit 11.**” *Id.* at 8:24-28.

193. These excerpts merely repeat or paraphrase the claim language and recite only the *function* of the unit—i.e., generating and transmitting button setting information. The specification includes no algorithm, no flowchart, no programming logic, and no hardware description that would guide a POSITA in understanding how to perform the recited functions.

194. In addition, Figure 1 (reproduced below) is the only figure that purports to illustrate the “button setting generating unit.” However, Figure 1 only includes an unlabeled box for “button setting generating unit 11” within the virtual controller server. It is my opinion that this box is merely a visual placeholder with no disclosed internal structure. It functions, in effect, as a black box. No disclosure in the ’709 Patent links any structure—physical, software, or algorithmic—to the functions recited in claim 4.

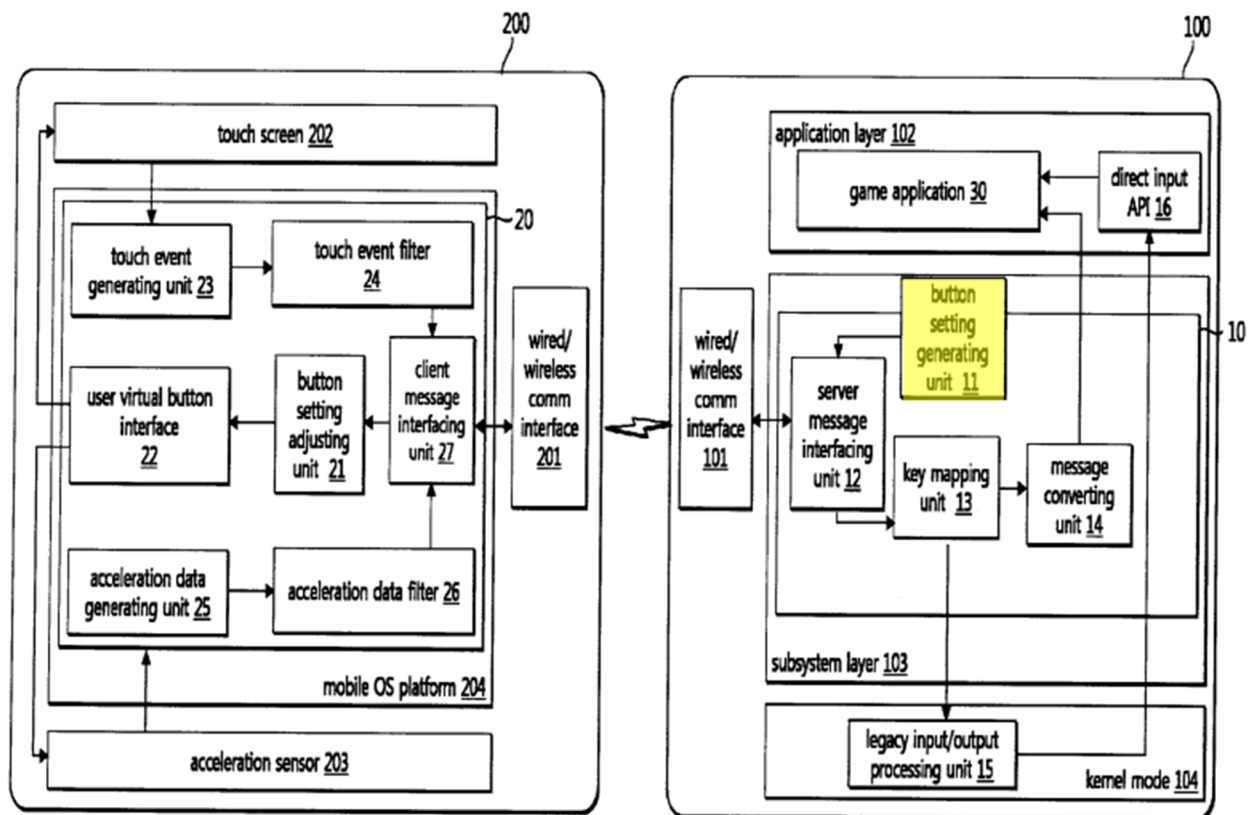


Fig. 1 of the '709 Patent (annotations added).

195. Additionally, as discussed above, the button setting generating unit 11, as depicted in Figure 1, presents a structural ambiguity by crossing functional boundaries in the system architecture. Part of it lies within the virtual controller server 10, while part lies outside of the server, but within the subsystem layer 103. The button setting generating unit is also an upstream mechanism, meaning that its input drives the rest of the components within the virtual controller server, terminating in the game application 30 and legacy input/output processing unit 15. As such, because a functional boundary is crossed, an infinite loop structure is set up, meaning that the button setting generating unit as a conglomerate component of the subsystem layer 103 could lead to self-excitation of the entire system, rendering it unstable. Because the specification provides no structural details or implementation guidance regarding the interaction across these functional boundaries, a person of ordinary skill in the art would not understand how to implement the “button setting generating unit” or discern its integration with the system.

196. While the specification also describes other components of the system—such as a key mapping unit, server message interfacing unit, or legacy input/output processing unit—it does not describe how the “button setting generating unit” interacts with these components to perform its function, nor does it describe any structural or algorithmic details of its operation.

197. Therefore, because (1) a POSITA would not understand “button setting generating unit” to recite sufficiently definite structure or (2) a POSITA would understand “button setting generating unit” to recite function without reciting sufficient structure for performing the function, I understand that the term “button setting generating unit” is properly construed as a means-plus-function term.

198. Having determined that the term “button setting generating unit” is properly construed as a means-plus-function term, it is my opinion, the function of “button setting generating unit” is “to generate and transmit, to the virtual controller client, first button setting information ... [and] in response to an occurrence of the event in the application, generate and transmit, to the virtual controller client, second button setting information including the dynamically changed virtual input message associated with the given key input.” This is apparent from the plain language of the claim and the specification as discussed above and expressly incorporated here.

199. As to the structure corresponding to that function, it is my opinion that the specification does not disclose sufficient structure that corresponds to the claimed invention. For the reasons discussed above, which are expressly incorporated here, it is my opinion that there is no structure or algorithm disclosed. Instead, the specification only recites functional language that adds nothing beyond the functional language already present in the claim language.

200. Thus, because there is insufficient structure corresponding to the claimed function, it is my opinion that the “button setting generating unit” term is indefinite and, thus, the claims reciting the term are invalid.

#### **I. Term 11: “Server message interfacing unit” (claims 4, 5)**

| <b>Term</b>                                   | <b>Plaintiff’s Proposed Construction</b> | <b>Defendant’s Proposed Construction</b>                                                                                                                                                                                                                                             |
|-----------------------------------------------|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Server message interfacing unit (claims 4, 5) | Plain and ordinary meaning               | Means plus function<br><br><u>Function:</u><br>“configured to transmit a setting message including the first button setting information to the virtual controller client, and to receive a virtual input message from the virtual controller client, the virtual input message being |



| Term | Plaintiff's Proposed Construction | Defendant's Proposed Construction                                                                                                                                                                                                                                                                                    |
|------|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      |                                   | <p>generated based on a touch on the touch screen display device of the mobile terminal ... [and] operable to receive a virtual input message generated based on a movement of the mobile terminal.”</p> <p><u>Structure:</u><br/>No corresponding structure disclosed. Therefore, the limitation is indefinite.</p> |

201. In my opinion, “server message interfacing unit” as claimed in claims 4 and 5 is a means-plus-function term because, from the perspective of a POSITA, the claim limitation does not recite definite structure that performs the claimed function. It is also my opinion that the specification of the ’709 Patent fails to disclose any structure corresponding to the functions performed by the “server message interfacing unit,” rendering the claim indefinite under 35 U.S.C. § 112, ¶ 2.

202. Beginning with the claim language, the term “server message interfacing unit” appears in independent claim 4 and dependent claim 5 of the ’709 Patent, which recite:

4. A computer comprising:

a virtual controller server configured to remotely communicate with a virtual controller client running on a remote mobile terminal including a touch screen display device for remote key input on an application running on the computer, the virtual controller server comprising:

a button setting generating unit configured to generate and transmit, to the virtual controller client, first button setting information including a mapping relationship between key inputs to the application and associated virtual input messages;

a **server message interfacing unit** configured to transmit a setting message including the first button setting information to the virtual controller client, and to receive a virtual input message from the virtual controller client, the virtual input message being generated based on a touch on the touch screen display device of the mobile terminal; and

a key mapping unit configured to identify a key input value mapped to the received virtual input message based on the first button setting information,

wherein the mapping relationship dynamically redefines the virtual input message associated with a given key input based on an event in the application,

wherein the button setting generating unit is further configured to, in response to an occurrence of the event in the application, generate and transmit, to the virtual controller client, second button setting information including the dynamically changed virtual input message associated with the given key input, and

wherein the key mapping unit is further configured to identify the key input value mapped to the dynamically changed virtual input message based on the second button setting information.

5. The computer of claim 4, wherein the mobile terminal further comprises an acceleration sensor configured to detect movements, and wherein the **server message interfacing unit** operable to receive a virtual input message generated based on a movement of the mobile terminal.

203. Based on this claim language, a POSITA would understand that the “server message interfacing unit” is “configured to transmit a setting message including the first button setting information to the virtual controller client, and to receive a virtual input message from the virtual controller client, the virtual input message being generated based on a touch on the touch screen display device of the mobile terminal.” Additionally, the “server message interfacing unit” is, for the purpose of claim 5 “operable to receive a virtual input message generated based on a movement of the mobile terminal.” In my opinion, this is the function performed by the “server message interfacing unit.”

204. I understand that the claim language does not use “means” in connection with “server message interfacing unit” such that there is a rebuttable presumption against construing the term as a means-plus-function term. But it is my opinion that the claim term fails to recite sufficiently definite structure or else recites function without reciting sufficient structure for performing that function. Specifically, after considering the words of the claims and the intrinsic evidence, and based on my experience, it is my opinion that there is no sufficiently definite

structure that a POSITA would understand for the “server message interfacing unit” and “server message interfacing unit” does not connote any particular structure or class of structure to a POSITA.

205. In my opinion, the term “unit” is commonly used as a placeholder or nonce term that refers to a generic component—either hardware or software—without indicating any particular structure. The term “server message interfacing unit” is merely a label for something that performs the recited functions—it provides no structural information that would guide a POSITA in identifying what physical or logical structure is being claimed.

206. The modifier “server message interfacing” also fails to provide structural context. It merely describes the data transmitted or received (i.e., “server messages”) and the general action of “interfacing.” These are functional descriptions rather than structural limitations. In my experience, the word “interfacing” connotes only a high-level concept of data exchange, not any particular mechanism, hardware, or protocol for doing so. Thus, this modifier does not impart any definite structure to the word “unit.”

207. I have reviewed the specification of the ’709 Patent and, in my opinion, it fails to disclose any corresponding structure that would allow a POSITA to understand what the “server message interfacing unit” actually is or how it performs the recited functions.

208. In addition, the specification treats the term so broadly as to generically be anything that performs the recited function. In particular, the specification describes the “server message interfacing unit” in general, functional terms, most of which merely parrots the functional claim language and none of which identify any corresponding structure. The only substantive description of the “server message interfacing unit” appears at the following:

- “a **server message interfacing unit** configured to transmit a setting message including the button setting information to the virtual controller client, and to

receive a virtual input message generated based on a touch on the touch screen from the virtual controller client; ...” *Id.* at 2:46-50.

- “The mobile terminal may further include an acceleration sensor configured to detect movements, and the **server message interfacing unit** may operate Such that it receives a virtual input message generated based on a movement of the mobile terminal.” *Id.* at 2:54-58.
- “For these purposes, the virtual controller server 10 may include a button setting generating unit 11, a **server message interfacing unit 12**, a key mapping unit 13, and a message converting unit 14.” 5:30-33.
- “The button setting generating unit 11 transfers the button setting information to the **server message interfacing unit 12**, and the **server message interfacing unit 12** in turn transmits the button setting information to the mobile terminal 200 via the wired/wireless communication interface 101.” *Id.* at 7:3-7.

209. “The virtual input message received by the wired/wireless communication interface 101 of the personal computer 100 is transferred to the key mapping unit 13 via the server message interfacing unit 12.” *Id.* at 8:20-23. These excerpts from the specification do nothing more than restate the claim functions in narrative form. They fail to disclose any structure, logic, algorithm, circuitry, or communication protocol that would enable a POSITA to understand how the “server message interfacing unit” operates. There is no detail about how the “server message interfacing unit” interfaces with the virtual controller client, how messages are formatted, how communications are routed, or what hardware or software components are involved.

210. The only figure that purports to illustrate the “server message interfacing unit” is Figure 1 (reproduced below), where it is labeled simply as item 12. Figure 1 identifies this as one of four subcomponents of the “virtual controller server.” However, the figure does not include any detail or graphical representation of the internal workings of this unit. It is merely a labeled block in a black-box diagram.

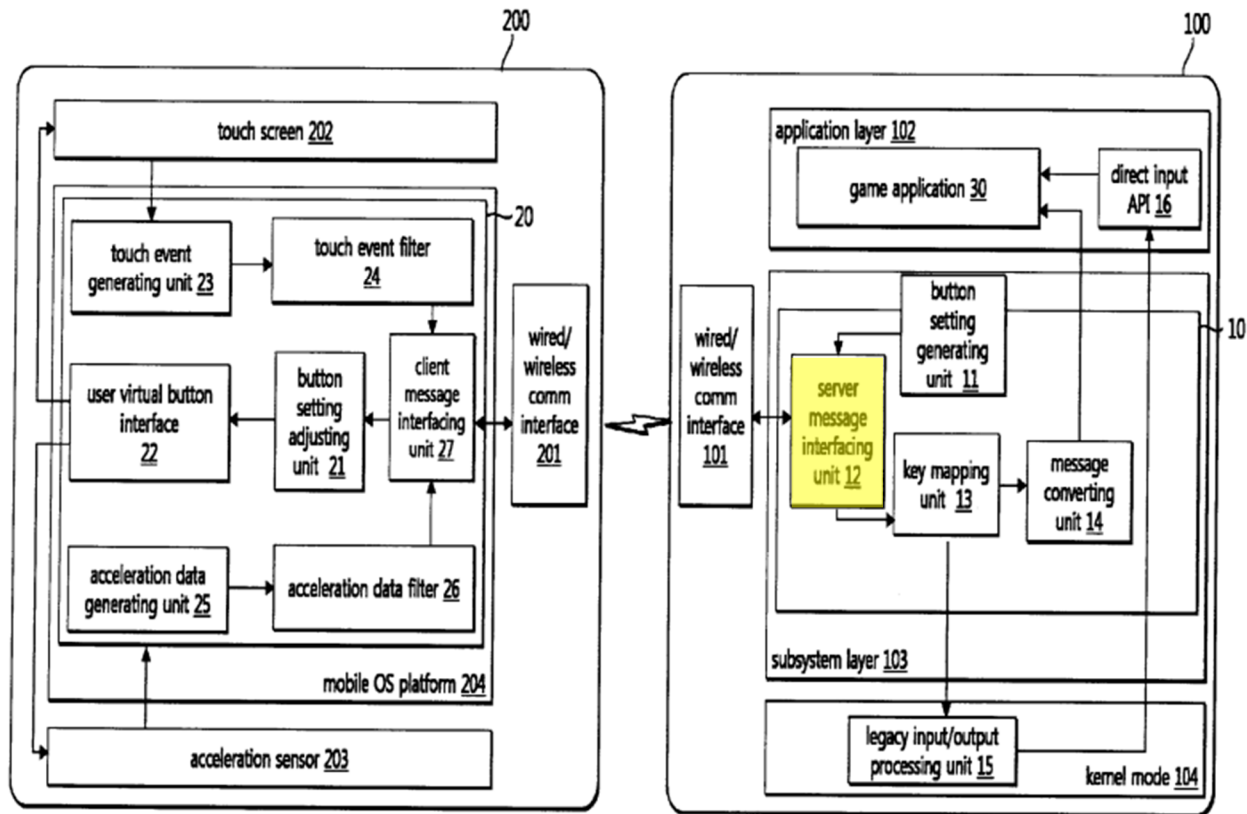


Fig. 1 of the '709 Patent (annotations added).

211. Further, the “server message interfacing unit” is just one functional step downstream of the “button setting generating unit” 11, indicating that the unstable functional loop that could be set up by the functional boundary crossing of the button setting generating unit 11 would simply be sent to the server message interfacing unit 12, thereby exacerbating an instability not just within the subsystem layer 103, but transmitting an unstable message to the mobile terminal 200 via the wired/wireless comm interfaces 101 and 102. Without a description of the code structure of the components within the subsystem layer 103 at least, such instability is a distinct possibility given the technical ambiguity depicted in Figure 1. As a result, a POSITA would be unable to understand how the claimed components are implemented or interact.

212. In addition, the specification does not disclose source code, algorithms, data structures, or architectural details for performing the claimed function.

213. Therefore, because (1) a POSITA would not understand “server message interfacing unit” to recite sufficiently definite structure or (2) a POSITA would understand “server message interfacing unit” to recite function without reciting sufficient structure for performing the function, I understand that the term “server message interfacing unit” is properly construed as a means-plus-function term.

214. Having determined that the term “server message interfacing unit” is properly construed as a means-plus-function term, it is my opinion, the function of “server message interfacing unit” is “to transmit a setting message including the first button setting information to the virtual controller client, and to receive a virtual input message from the virtual controller client” and, for purposes of claim 5, “to receive a virtual input message generated based on a movement of the mobile terminal.” This is apparent from the plain language of the claim and the specification as discussed above and expressly incorporated here.

215. As to the structure corresponding to that function, it is my opinion that the specification does not disclose sufficient structure that corresponds to the claimed invention. For the reasons discussed above, which are expressly incorporated here, it is my opinion that there is no structure or algorithm disclosed. Instead, the specification only recites functional language that adds nothing beyond the functional language already present in the claim language.

216. Thus, because there is insufficient structure corresponding to the claimed function, it is my opinion that the “server message interfacing unit” term is indefinite and, thus, the claims reciting the term are invalid.

**J. Term 12: “Key mapping unit” (claims 4, 6, 7)**

| <b>Term</b>                       | <b>Plaintiff’s Proposed Construction</b> | <b>Defendant’s Proposed Construction</b> |
|-----------------------------------|------------------------------------------|------------------------------------------|
| Key mapping unit (claims 4, 6, 7) | Plain and ordinary meaning               | Means plus function                      |

| Term | Plaintiff's Proposed Construction | Defendant's Proposed Construction                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|------|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|      |                                   | <p><u>Function:</u><br/> “configured to identify a key input value mapped to the received virtual input message based on the first button setting information ... [and] further configured to identify the key input value mapped to the dynamically changed virtual input message based on the second button setting information.” Additionally, the recited function may include “transfer[ring] a key input value to the application via a message transfer architecture of an operating system that runs the application on the computer” and/or “transfer[ring] a key input value to the application via an input and output application programming interface (API) of an operating system that runs the application on the computer.”</p> <p><u>Structure:</u><br/> No corresponding structure disclosed. Therefore, the limitation is indefinite.</p> |

217. In my opinion, “key mapping unit” as claimed in claims 4, 6, and 7 is a means-plus-function term because, from the perspective of a POSITA, the claim limitation does not recite definite structure that performs the claimed function. It is also my opinion that the specification of the ’709 Patent fails to disclose any structure corresponding to the functions performed by the “key mapping unit,” rendering the term indefinite under 35 U.S.C. § 112, ¶ 2.

218. The term “key mapping unit” appears in asserted claims 4, 6, and 7 of the ’709 Patent as follows:

4. A computer comprising:

a virtual controller server configured to remotely communicate with a virtual controller client running on a remote mobile terminal including a touch screen display device for remote key input on an application running on the computer, the virtual controller server comprising:

a button setting generating unit configured to generate and transmit, to the virtual controller client, first button setting information including a mapping relationship between key inputs to the application and associated virtual input messages;

a server message interfacing unit configured to transmit a setting message including the first button setting information to the virtual controller client, and to receive a virtual input message from the virtual controller client, the virtual input message being generated based on a touch on the touch screen display device of the mobile terminal; and

a **key mapping unit** configured to identify a key input value mapped to the received virtual input message based on the first button setting information,

wherein the mapping relationship dynamically redefines the virtual input message associated with a given key input based on an event in the application,

wherein the button setting generating unit is further configured to, in response to an occurrence of the event in the application, generate and transmit, to the virtual controller client, second button setting information including the dynamically changed virtual input message associated with the given key input, and

wherein the **key mapping unit** is further configured to identify the key input value mapped to the dynamically changed virtual input message based on the second button setting information.

6. The computer of claim 4, wherein the **key mapping unit** transfers a key input value to the application via a message transfer architecture of an operating system that runs the application on the computer.

7. The computer of claim 4, wherein the **key mapping unit** transfers a key input value to the application via an input and output application programming interface (API) of an operating system that runs the application on the computer.

219. Based on this claim language, a POSITA would understand that the “key mapping unit” is (1) “configured to identify a key input value mapped to the received virtual input message based on the first button setting information” and (2) “further configured to identify the key input value mapped to the dynamically changed virtual input message based on the second button setting



information.” Additionally, the “key mapping unit” may include, for purposes of claim 6 “transfer[ring] a key input value to the application via a message transfer architecture of an operating system that runs the application on the computer” and, for purposes of claim 7 “transfer[ring] a key input value to the application via an input and output application programming interface (API) of an operating system that runs the application on the computer.” In my opinion, this is the function performed by the “key mapping unit.”

220. I understand that the claim language does not use “means” in connection with “key mapping unit” such that there is a rebuttable presumption against construing the term as a means-plus-function term. But it is my opinion that the claim term fails to recite sufficiently definite structure or else recites function without reciting sufficient structure for performing that function. Specifically, after considering the words of the claims and the intrinsic evidence, and based on my experience, it is my opinion that there is no sufficiently definite structure that a POSITA would understand for the “key mapping unit” and “key mapping unit” does not connote any particular structure or class of structure to a POSITA.

221. In my opinion, a POSITA would understand the phrase “key mapping unit” to be a purely functional term that does not connote any definite structure. The term “unit” is a generic placeholder—what courts and the technical literature often refer to as a “nonce” term. It provides no structural meaning and merely serves as a label for “whatever performs the stated function.” In my experience, and based on my review of the patent’s disclosure, the word “unit” does not denote any particular machine, algorithm, circuitry, module, or class of components. It is no more structurally descriptive than the word “means” itself.

222. The modifier “key mapping” likewise fails to impart structural meaning. It merely describes the function of the unit—i.e., mapping or associating one input (a virtual message) with

another (a key input value). It does not describe how this function is performed or suggest any particular structure, class of structures, or implementation to a POSITA. Based on my experience, “key mapping” does not refer to any standard component or understood structure in the field of input-device interfacing or operating system interaction. In this context, “key mapping unit” is merely a black-box label for a set of operations without disclosure of the machinery or algorithm used to perform those operations.

223. In addition, the specification treats the term “key mapping unit” so broadly as to generically be anything that performs the recited function. In particular, the specification describes the “key mapping unit” in general, function terms, most of which merely parrots the functional claim language and none of which identify any corresponding structure. The only references to “key mapping unit” in the specification appear as follows:

- “a **key mapping unit** configured to identify a key input value mapped to the received virtual input message based on the button setting information.” *Id.* at 2:51-53.
- “The **key mapping unit** may transfer a key input value to the application via the message transfer architecture of an operating system that runs the application on the computer. The **key mapping unit** may transfer a key input value to the application via the input and output application programming interface (API) of an operating system that runs the application on the computer.” *Id.* at 2:59–65. “For these purposes, the virtual controller server 10 may include a button setting generating unit 11, a server message interfacing unit 12, a **key mapping unit 13**, and a message converting unit 14.” *Id.* at 5:30–33.
- “The virtual input message received by the wired/wireless communication interface 101 of the personal computer 100 is transferred to the **key mapping unit 13** via the server message interfacing unit 12. The **key mapping unit 13** may identify the key input value mapped to the virtual input message received from the virtual controller client 20 based on the button setting information previously set by the button setting generating unit 11.” *Id.* at 8:20–28.

224. These statements simply restate the functions recited in the claims and provide no information about how the “key mapping unit” performs those functions. The specification does

not describe any hardware, circuitry, algorithm, flowchart, code, or pseudocode. It merely confirms that the “key mapping unit” performs certain actions (e.g., transferring or identifying input values), without describing any structure or method for doing so.

225. The only figure that purports to illustrate the “key mapping unit” is Figure 1 (reproduced below), which is intended to illustrate the overall system, simply lists the “key mapping unit” without any accompanying diagram or structural explanation. In my opinion, such a reference does not clearly link the claimed function to a structure. There is no depiction or explanation of internal structure, process flow, data tables, logic, or algorithms. In my opinion, a POSITA would not derive any meaningful structural detail from such a generic diagram.

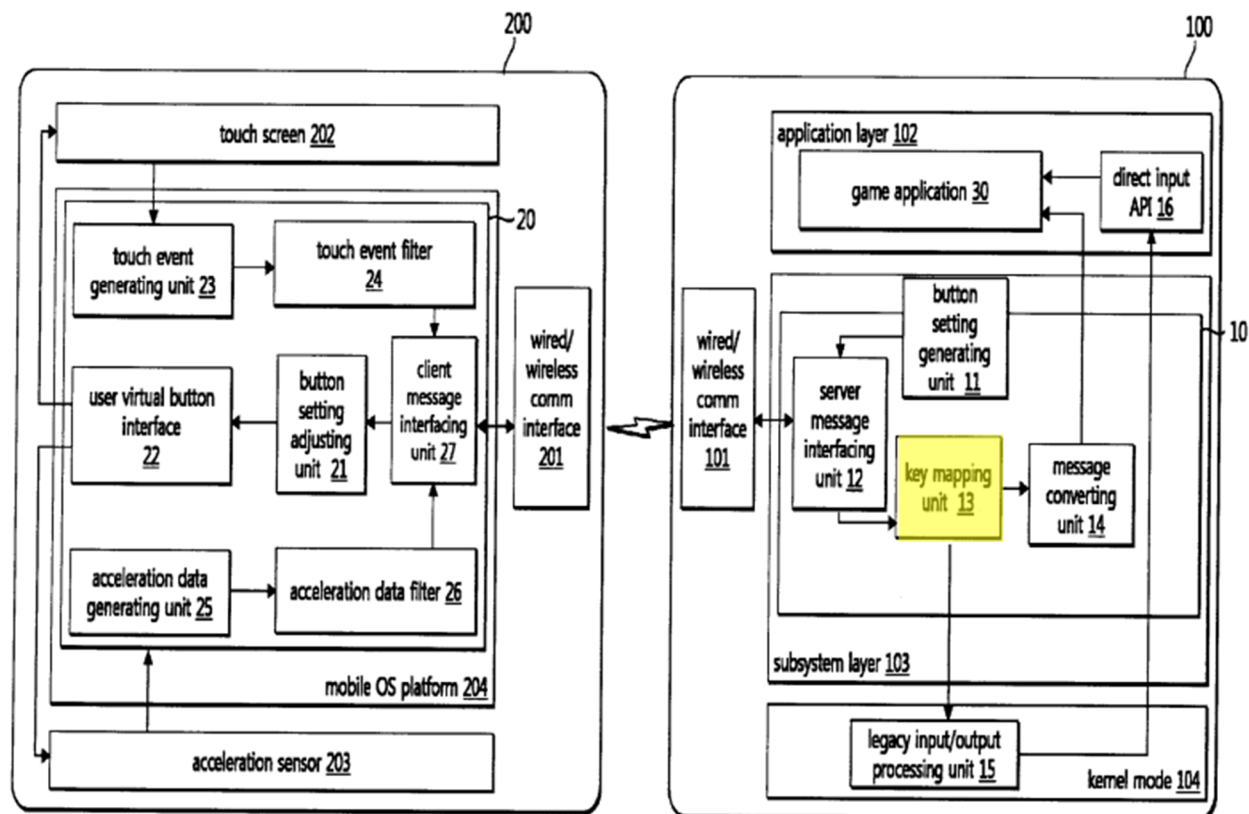


Fig. 1 of the '709 Patent (annotations added).

226. As noted above, the lack of disclosed structure for the button setting generating unit and its undefined interface across functional boundaries also affects the “key mapping unit,” which

operates within the same structurally ambiguous loop. Because the specification provides no structural detail for the key mapping unit, a POSITA would be unable to determine how it is implemented or integrated within the system. In addition, the specification does not disclose any source code, algorithms, data structures, or architectural details for performing the claimed function.

227. Therefore, because (1) a POSITA would not understand “key mapping unit” to recite sufficiently definite structure or (2) a POSITA would understand “key mapping unit” to recite function without reciting sufficient structure for performing the function, I understand that the term “key mapping unit” is properly construed as a means-plus-function term.

228. Having determined that the term “key mapping unit” is properly construed as a means-plus-function term, it is my opinion, the function of “key mapping unit” is “to identify a key input value mapped to the received virtual input message based on the first button setting information [and] to identify the key input value mapped to the dynamically changed virtual input message based on the second button setting information.” This is apparent from the plain language of the claim and the specification as discussed above and expressly incorporated here.

229. As to the structure corresponding to that function, it is my opinion that the specification does not disclose sufficient structure that corresponds to the claimed invention. For the reasons discussed above, which are expressly incorporated here, it is my opinion that there is no structure or algorithm disclosed. Instead, the specification only recites functional language that adds nothing beyond the functional language already present in the claim language.

230. Thus, because there is insufficient structure corresponding to the claimed function, it is my opinion that the “key mapping unit” term is indefinite and, thus, the claims reciting the term are invalid.

**IX. Supplementation and Conclusion**

231. I reserve the right to supplement this declaration based on additional information, including but not limited to Plaintiff's claim construction arguments and any opinions offered by any other expert or testimony from any other witnesses in these proceedings.

232. I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct. Executed on the 25th day of July 2025 in Las Vegas, NV.

A handwritten signature in blue ink, appearing to read "Ron Barrett", is written over a horizontal line.

Dr. Ronald Barrett